

BEYOND FUTURISM: BRUNO MUNARI'S USELESS MACHINES

Pierpaolo Antonello (University of Cambridge)

*This essay is part of an ongoing research project on the relationship between technology and the arts in 20th century Italy. It will be titled Leonardo's Children, and it aims to present a series of case studies on how Leonardo da Vinci's method and understanding of the relationship between art and technology has been conceptualized and reproduced in 20th-century Italian culture. It is an interdisciplinary project that will consider visual artists such as Bruno Munari and Eugenio Carmi, writers such as Primo Levi and Carlo Emilio Gadda, architects like Paolo Portoghesi and Pier Luigi Nervi, musicians like Giorgio Battistelli. A shorter version of this essay has been published in G. Berghaus (ed.), *Futurism and the Technological Imagination*. Amsterdam: Rodopi, 2009. We want to thank the book editor Gunter Berghaus, and Esther Roth at Editions Rodopi for granting us the permission to make this text available on Munart.*

Bruno Munari is surely known worldwide mainly for his post-WWII activity as an eclectic artist, designer and pedagogue. His ability of combining a holistic understanding of artistic praxis with a dose of irony and lightness earned him the reputation of being “the Leonardo and the Peter Pan of twentieth century Italian art” (Restany 1999: 254).¹ He was one of the front-runners of an artistic movement that helped to invigorate the art scene in Italy, in particular

¹ For Pierre Restany, Munari “è stato il Leonardo e il Peter Pan del design italiano” che “ci ha dato, con eleganza pari alla levità, la più magistrale lezione d’umanesimo: in piena epoca di globalizzazione culturale ha saputo, nel corso di un’intera vita, conciliare l’*esprit de géométrie* con l’*esprit de finesse*”; (Restany 1999). Also in Finessi 1999: 254. See also Rizzi 2007: 89.

industrial design, and to move it towards a more thorough integration with the productive world of technology and industry.

However, many critical and historical accounts and analyses prefer to ignore or underplay the fact that, at the beginning of his career, Munari joined Marinetti's Futurist circle,³ and that his work represented within that art movement — and within early twentieth century Italian culture in general — an interesting turning point with regard to the relationship between art and technology. An analysis of Munari's work, in particular of his famous "useless machines", could demonstrate how, in the late 1920s and early 1930s, a different modality in the conceptualization and artistic use of technology became available within Italian culture.

In reference particularly to Futurism, as I will try to show, Munari's art developed with both open references and gradual distancing from many of the ideas and suggestions produced within the Futurist movement — if considered from a formal and artistic viewpoint. From an ideological and epistemological perspective, Munari's work, actually, must be considered a radical break with the Futurist experience, in particular his "useless machines", expressed a radically different understanding of technology and its function in the modern age. While Futurist representations of technology and machinery were, at least in the early period, in the 10s, attached to

³ In the famous 1986 exhibition on Futurism at the Palazzo Grassi in Venice, curated by Pontus Hulten, Munari was present with only one work, and he is barely mentioned in the Catalogue. The same applies to the more recent exhibition organized by Lista in Milan at Palazzo Reale.

aggression, power, speed, dynamism and war, and later, in the 20s and 30s, to idealistic spirituality, Munari's conception was moving in quite the opposite direction, towards an un-ideological, understated comprehension and manipulation of the primary and basic constituents of technological apparatuses and mechanisms, which came very close to the ideas espoused by other major trends in the broader European context such as Russian Constructivism or the Bauhaus. As a matter of fact, considering that Futurism was the very first movement in Europe to place technology and machines at the centre of its artistic and philosophical interests, Munari — by choosing to craft artistic “machines” — explicitly entered a discursive matrix that was already saturated by the Futurist imagination and artistic language. In this sense, Munari's so-called “useless machines” [*macchine inutili*] could be seen as a surreptitious counter-argument to the technophile rhetoric of Futurism.

“THE VERY INGENUOUS MUNARI”

When, in 1925, Munari moved from his Veneto home town Badia Polesine to Milan, he was 18 and he almost immediately joined the Futurists. Futurism was one of the driving artistic forces in Italy and possessed some of the most

active groups in the country, particularly in Milan. It is likely that he felt drawn towards them because of the heterogeneity of their methods, their ability to mix different art forms and techniques, their exploration of new media and new avenues of expression, quite congenial to his own conception of art, and because of their links with the cultural industry (design, advertisement, graphics, architecture, etc.)

Munari was soon recognized as a versatile and multifaceted artist and became involved in a variety of projects. In an article published in *La rivista illustrata del Popolo d'Italia*, the editor Manlio Morgagni commented:

Everybody [...] agrees about his extraordinary imagination and balance, typical of an authentic artistic character. [...] Munari is ingenious; he will surely find his way if he will show strong character and willingness to constantly improve himself, if he will not try to follow other people's taste, distrust obliging flattery and act in accordance with his innermost urges. (Morgagni 1929: 57)

Also Marinetti himself offered some approving remarks when, in his review of the 1929 Futurist show at the Galleria Pesaro in Milan, he wrote that “the Milanese Futurist painters, guided by the young and very ingenious Munari, are present in full force” (Marinetti 1929: 57). As a fine artist, then he participated in various Futurist group exhibitions in Italy and abroad, like the Venice Biennale (1930, 1934, 1936), the Rome Quadriennale (1931), the

Milan Triennale (1933, 1936, 1940), and in two Parisian group shows held at the Galerie 23 (1930) and the Galerie de la Renaissance (1932).

Munari's relationship with the Futurist movement however was far from being forthright and heartfelt. In both his sketchy autobiography and in the various interviews he gave in 70s and 80s, Munari tended to evade questions that referred to his "Futurist years" and to downplay his initial attachment to the movement, characterizing it as a phase in his career that had only historical significance.⁶ He claimed – and the oxymoron was consciously and ironically chosen here – that he had had a "Futurist *past*" (Dorfles 1999: 192). His temperament was quite removed from the bombastic rhetoric and clownesque elements of Futurist propaganda. Riccardo Castagnetti, who was Munari's assistant and business partner in the 1930s, remembers the total lack of *vis polemica* in Munari and the fact that he watched the Futurist "brawls" and "riots" with a detached smile (Ricas 1999: 63). As I said, the few historical accounts available of Munari's early career show, on the one hand, a relationship of proximity to the Futurist movement, and on the other a gradual distancing towards and eventually a full emancipation from Marinetti's group. This was primarily due to aesthetic rather than political reasons (Meneguzzo 1993, Tanchis 1986). Although, in some of his writing of the period,⁷ — for

⁶ As Meneguzzo pointed out "Munari non vuole correre il rischio che tutto quello che ha fatto nel corso di più di sessant'anni di lavoro venga catalogato come un derivato futurista per il solo fatto di avere partecipato — dal 1927 al 1936 circa — ad alcune mostre del movimento [...], come esponente del gruppo, ma al contrario pretende che il suo lavoro venga considerato quasi secondo in andamento che vorrei definire 'orizzontale', cioè slegato da un prima e dopo troppo determinati, troppo scanditi da un percorso storico costruito senza scossoni, senza scarti laterali [...], magari a distanza di decenni" (Meneguzzo 1995: 7).

⁷ See for instance the "Manifesto dei futuristi venticinquenni" (1934), signed by Munari, Carlo Manzoni, Gelindo Furlan, Ricas and Regina: "secondo i nuovi progetti [...] che glorificheranno nei secoli la potenza politica e artistica di questa formidabile Italia fascista in cui abbiamo la gioia

instance the *Manifesto dei futuristi venticinquenni* (1934), co-signed with Furlan, Manzoni, Castagnetti and Regina and then published as *Manifesto tecnico dell'aereoplastica futurista*⁸ — he played lip-service to Futurism and to Fascism apparently there were no real ideological motivations behind Munari's artistic activities.⁹

One may wonder if there were mainly opportunistic, self-promotional reasons for joining the Futurist group, although later he commented caustically on Marinetti's abilities as an artistic entrepreneur: "Marinetti used to summon us imperiously [...] although the art shows he organized were held in the summer, during the low season of art galleries" (Meneguzzo 1995: 10).

Already in 1927, when Munari was only 20 years old, one can discern elements that were indicative of an ironic distance towards the aesthetic theories of Futurism, particularly in reference to aeropainting, which was a dominant trend in Futurist art at that time, and to which Munari indeed contributed in the 30s, mostly in his role of graphic designer. In his collage *rRrR [Rumore di aeroplano]* (Noise of the Aeroplane) one can clearly see the ironic and parodic allusion to the onomatopoeic experimentation in Marinetti's famous words-in-freedom novel: *Zang Tumb Tuuum* (1914), starting from the very name he adopted to sign the painting: "BUM", which is both an

immensa di vivere!"; Autograph Manuscript, in Marinetti Libroni, GEN MSS 475 / 10608-01, Beinecke Rare Books and Manuscripts Library, Yale University.

⁸ In *Omaggio dei futuristi venticinquenni al venticinquennio del futurismo*, Catalogo della mostra, Galleria Tre Arti, Milano, marzo 1934, in C. Salaris, *aero... futurismo e mito del volo*, Le Parole Gelate, Roma, 1985, p. 36.

⁹ As a matter of fact, his idea of art was very democratic and quite anti-elitist, much closer to Russian Constructivism, which rejected the idea of "art for art's sake" in favour of art as a practice directed towards social purposes.

abbreviation of Bruno Munari and the most common onomatopoeia in Italian usage associated to an explosion. The letters 'R' are written in ink, capitalized or in small capitals, italicized, as if it were part of a table in a first grade spelling-book. The airplane does not show any dynamism; the wheels are those of a bicycle and the perspective is overtly askew. The drawing does not reflect the oblique vision provoked by flight, much dear to aero-painters such as Tullio Crali or Fedele Azari, but mimics in parodic terms the drawings of elementary school kids.¹⁰ [Fig. 1]



Fig. 1 – Munari,
Noise of Areoplan 1927

The same tongue-in-cheek tone towards the rhetoric of machines is visible in this painting titled *The Machines Hospital*, which seems a response to the 1927 Felice Azari's Manifesto *Per una società di protezione delle macchine*

¹⁰ See Becker 2008: 72-73.

[*For a Society for the Protection of Machines*], in which Azari stated that machines are living beings with their peculiar and specific intelligence and sensibility. [Fig. 2]



Fig. 2 – Munari
The Machines Hospital 1929

Another example of his ironic attitude towards aeropainting is also visible in a series of later photomontages made in mid-30s, like “La gioia poetica del volo”, or “Ci porremmo dunque in cerca di una femmina d’aereo”. Also in “Sosta aerea” [The aerial standstill], he seems to joke about the futurist notions of dynamism, movements, speed, as everything in the painting is fixed in a sort of abstract and geometrical immobility and there are no actual traces of an airplane represented. [Fig. 3]



Fig. 3 – Munari
The Poetic Joy of Flight 1936

In 1929, Munari also executed the stage and costume designs for Marinetti's play *Il suggeritore nudo* (The Naked Prompter). The preparatory drawings, which also served as illustrations to the published version of the play in *Comoedia*, reduced the human figure to geometric and mechanical forms that seem to resemble Depero's *Meccanica di Ballerini* (1917) or the costumes for *Aniccham del 3000* (1924), or for Ruggero Vasari's *L'angoscia delle macchine* (The Anguish of the Machines, 1926) (Lista 2001: 146-49), but in general they borrow from the general tendency of bodily stylization which was dominant for instance in advertising in that period. On this score, Munari has always been looking for geometrical essentialism if not minimalism, when studying and representing the human figure, as one can see for instance in the 1927 *Portrait of the Futurist Luigi Russolo*.¹¹ [Fig. 4-5-6]

¹¹ I owe this remark to Miroslava Hayek.



Fig. 4 – Munari, The Naked Prompter 1927

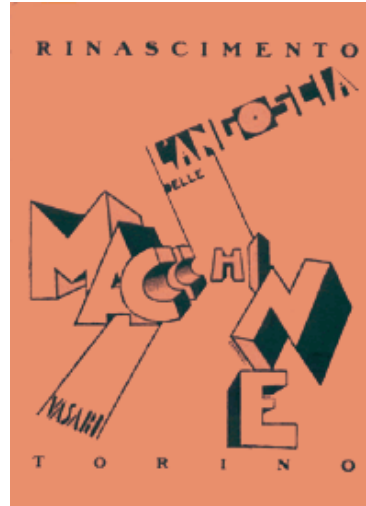


Fig. 5 – Vasari, The Anguish of the Machine 1926



Fig. 6 – Munari
Portrait of the Futurist Luigi Russolo 1927

However, it is clear from this example that Munari's stylistic options did not have any "militant" purpose. His propensity for geometrical shapes was not guided by any 'Futurist' agenda. A similar quasi-mechanical and geometrical stylization of human characters was employed in his illustrations to a sentimental and romantic short story by Lyana Cambiasi, *Fra due mantelli* (Between Two Capes, 1929), published in a very "unfuturistic" women's magazine *Lide!* which, for a few issues, counted Munari amongst its

collaborators (Cambiasi 1929).¹² He also used the same style and technique for greeting postcards. [Fig. 7]



Fig. 7 – Munari, *Between Two Capes* 1929

As a matter of fact, at that stage of his career, Munari made his living more as a commercial graphic designer than as a fine artist. He was not really in the business of “self-expression”, as this entails a romantic and idealistic notion of art and the artist that remained quite alien to his attitude and aesthetics. Rather, his art was the result of an attitude of playfulness and experimentation. Munari’s natural curiosity for different techniques and styles meant that he would not let himself be regimented, and he was unwilling to comply with any prescriptive terms or to let himself be put into any aesthetic straightjacket, being futurist or other.

Since 1929, Munari had worked in various advertising agencies, including Carlo Cossio’s IPC, “pioneer in the use of the animated cartoon in Italian advertising” (Tanchis 1986: 128). The following year, together with the above-mentioned Riccardo Castagnetti, he opened one of the first Italian advertising agencies, the *R+M*, and started to collaborate on a variety of projects, of very

¹² Cfr. also Luciana, “Bibite estive” in *Lidel* 7 (1930): 25; L. Ridenti, “Sotto un tetto amico”, in *Lidel* 8 (1930): 50-51; Dancing, “Quest’anno balleremo”, in *Lidel* 9 (1930): 47; Luciana, “In cerca di funghi” in *Lidel* 9 (1930): 23.

different nature, like office interiors and shop windows as well as advertising signs and catalogues for various companies such as the Società del Linoleum. He was also commissioned to design and illustrate Tullio d'Albisola's *L'anguria lirica* (The Lyric Watermelon, 1934), futuristically printed on tin foils; Marinetti's *Il poema del vestito di latte* (The Poem of the Milk Dress, 1937), a volume brilliantly enhanced by graphic overlays and transparencies, as well as a collection of 'unfuturistic' love poems by Renato Simone, *Il cantastorie di Campari* (The Storyteller of Campari, 1932). [Fig. 8-9-10]



Fig. 8 – Albisola, The Lyric Watermelon 1934



Fig. 9 – Marinetti
The Poem of the Milk Dress 1937



Fig. 10 - The Storyteller of Campari, 1932

In the early 1930s, Munari also started producing some of his most famous works, the so-called *useless machines*, which were hanging objects in the style of Man Ray's aerial construction (the famous lampshades) or Calder's mobiles (although they pre-date the latter). Their artistic originality signalled his departure from Futurism and a move towards Abstractionism (Solimano 1997: 62):

In 1933, the first abstract paintings were made in Italy; they were nothing more than geometric forms or colored spaces

without reference to so-called exterior nature. Often these abstract paintings depicted still lives in geometric forms painted in realistic manner. (...) Personally, I thought that instead of painting squares, triangles and other geometric forms which still had a realistic feel (take Kandinsky, for instance), it might be interesting to free abstract forms from the staticity of paintings and suspend them in the air, joining them together so that they might inhabit our environment with us, sensitive to the actual feel of reality. (Munari 1966: 10)¹³

Before entering in the critical discussion about the useless machines, the reference to Kandinsky is revealing, since Munari was influenced by many artists outside the Futurism circle, and his interest in Abstractionism came to the fore quite early on in his career. It is not by chance that his first solo show was held at the Milione Gallery in Milan.

This venue was founded in 1930 by Gino Ghiringhelli and directed by Edoardo Persico, who was at that time also the director and editor of *Casabella*, a magazine which was to become — alongside *Domus*, founded in 1928 by Gio Ponti — a point of reference for architects and designers worldwide. It was thanks to Persico that the works of Gropius, Le Corbusier and Frank Lloyd Wright were discussed and analysed in Italy, and in Milan particularly.

¹³ ‘Nel 1933 si dipingevano in Italia i primi quadri astratti che altro non erano che forme geometriche o spazi colorati senza alcun riferimento con la cosiddetta natura esteriore. Spesso questi quadri astratti erano delle nature morte di forme geometriche dipinte in modo verista. [...] personalmente pensavo che, invece di dipingere dei quadrati e dei triangoli o altre forme geometriche dentro l’atmosfera, ancora verista (si pensi a Kandinski) di un quadro, sarebbe stato forse interessante liberare le forme astratte dalla staticità del dipinto e sospenderle in aria, collegate fra loro in modo che vivessero con noi nel nostro ambiente, sensibili alla atmosfera vera della realtà.’

Consequently, the Milione Gallery became the meeting point for key representatives of Italian rationalist architecture like Giuseppe Terragni, Alberto Sartoris, Luigi Figini and Gino Pollini. This fervid intellectual activity and the need to de-provincialize Italian culture, resulted also in the impressive line-up of invitation for the IV Triennale organized in Monza in 1930, where all the major contemporary architects were present: Le Corbusier, Loos, Mies van de Rohe, Gropius, Dudok, Hoffman, Wright, Melnikov, Perret. This gives the idea of how loose at that time was the control of the Fascist regime in terms of cultural standardization or centralized hegemonic aesthetic agenda.¹⁴ The Milione gallery was a private institution that explicitly wanted to gather an intellectual, cultural and artistic élite who were well connected to the European art scene and in opposition to the provincial and nationalistic rhetoric extolled by the Fascist régime, by conservative art movements like the *Novecento*, and to some degree also by the Futurists (Caramel 1982).

The Milione Gallery was not only an exhibition space, but also a meeting point, a workshop and a library (Pontiggia 1988), where people like the young Munari could read the famous *Bauhausbücher* (14 volumes published between 1925 and 1931), and where he could familiarize himself with the experimental graphics of Moholy Nagy and Herbert Bayer, director of the print workshop at the Bauhaus. Very much in the spirit of the Bauhaus, besides conferences and art exhibitions, the Milione Gallery also organized music concerts, fashion shows, displays of graphics, modern furniture and crafts.

¹⁴ Cfr. Anty Pansera con la collaborazione di Dario Marchesoni e Anna Pierpaoli, *Le Triennali*, in *Gli Annitrenta. Arte e cultura in Italia*. Milan: Mazzotta, 1983: 311-24.

In the gallery's house magazine, *Il milione: Bollettino della Galleria del Milione*, Persico also serialized some fundamental texts of the abstract art movement in Europe, such as Kandinsky's *Punkt und Linie zu Fläche* (Point and Line to Plane, 1926) or Paul Klee's *Tagebücher* (Notebooks, 1920). In fact, many of the artists gathering at the Galleria Milione, such as Lucio Fontana, Atanasio Soldati, Mauro Reggiani and Luigi Veronesi became leading figures in Italian abstract art, and abstractionism became one of the main line of investigation and expression for Munari in his art-work.¹⁵

At the Milione it was also possible to have access to influential French journals such as *Abstraction - Création* (1932), *Cercle et Carré* (1930) and *Cahiers d'Art* (1926-1960), which allowed Munari to become familiar with the artistic research of Surrealism and Dadaism (Quintavalle 2008: 34). These contacts may explain the genealogy of the Dadaist and Surrealist elements in some of Munari's early works like in *Self Portrait* (1930) or in the later *Painter at the Easel* (1937) (Tanchis 1986: 15).¹⁶ [Fig. 11]

¹⁵ For the development of abstract art in Italy see E. Crispolti (ed.), *Dal futurismo all'astrattismo. Un percorso d'avanguardia nell'arte italiana del primo Novecento*, con la collaborazione di M. Tonelli, Rome: Edieuropa/De Luca Editori, 2002.

¹⁶ *Movement and Space* (1928) is similar to the style that Paladini and Pannaggi experimented with (Lista 2001: 195),



Fig. 11 – Munari
Self Portrait 1930

In the article by Marinetti about the exhibition at the Galleria Pesaro in Milan that I mentioned before, the founding father of Futurism, in spite of his praising of Munari's craft and genius, failed to mention that his work was far from being Futurist in style and spirit. Munari's *Architettura femminile*, for instance, was an exercise in geometrical investigation of the human (female) form, much in the Cubist tradition where movement and dynamism are suppressed in favour of analytical abstraction. This work finds also a companion in Fillia's *Femminilità* (1927).¹⁷ [Fig. 12]



Fig. 12 – Fillia, *Femminilità* 1927

¹⁷ The same was remarked upon with regard to some other paintings exhibited at the Galleria Pesaro, and to later exhibitions of the period such as the “Mostra futurista arch. Sant’Elia e 22 pittori futuristi”, also held at the Galleria Pesaro in 1930. He was dialoguing with Klee, he had an awareness of Georges Braque’s research, who was by then part of synthetic cubism, aspect of surrealist experimentation” (Bianchino 234).

Also in his illustrations for *La rivista illustrata del Popolo d'Italia* — like, *Il tifoso* (The Fan), *L'inutile acrobazia* (Useless Stunt), or *Per il quinto di secondo* (For the Fifth of a Second) — both abstract and surrealist elements were employed and combined. [Fig. 13-14-15]



Fig. 13 – Munari, The Fan



Fig. 14 – Munari, Useless Stunt



Fig. 15 – Munari, For the Fifth of a Second

Works like *Autoritratto*, *La mano che costruisce* were surely inspired by the early experimentation of Moholy-Nagy and of Russian Constructivism with photomontage, which came to Munari also through the influence of fellow Futurist artists like Vinicio Paladini. This technique was widely applied by

Munari in a period in which there was very scanty if not negligible use of photography in advertising.¹⁸ [Fig. 16]



Fig. 16 – Paladini, Photomontage 1928

So, in general, Munari was a conspicuous example of an artist who tried to integrate various sources of inspiration into his artistic vocabulary and to channel those influences into his rigorous artistic research that was tending towards existentialism, geometrical abstraction, functionalism and natural forms. Munari once claimed in an interview that for him “it was a matter of ‘trying things out’, of wanting to know as much as possible” (Quintavalle 2008: 243).

Still Futurist?

However, from a critical standpoint, it is also important to acknowledge the role that Futurism clearly played in the development of Munari’s work.

¹⁸ Marinella Pigozzi, *Grafica industriale*, in *Gli Anni Trenta*, pp. 467-76 (p. 475)

Although later in life, as I said, Munari underplayed that phase in his career, there can be no doubt that it had an influence on his œuvre, as it offered him many inspirational ideas and fostered a certain attitude towards artistic creation. In the sketch *L'uomo che cammina* (Man Walking, 1931), for instance, it is evident that Munari was trying to study and replicate Boccioni's famous sculpture *Unique Forms of Continuity in Space* (1913). [Fig 17-18]



Fig. 17 – Munari, Man Walking 1931



Fig. 18 – Boccioni, Unique Forms of Continuity in Space 1913

The same could be said about some preparatory sketches drawn by Munari in the early 20s and where one can easily detect the resemblance with Giacomo Balla paintings *Dinamismo di un cane al guinzaglio* [Dynamism of a dog on the leash] (1912) or *Ragazza che corre sul balcone* [Girl who runs on a balcony] (1913).¹⁹ [Fig. 19-20]

¹⁹ However, it is interesting to see Munari's personal interpretation of Boccioni's sculpture, since apparently he was more interested in the over-all geometric structure of the figure rather than in its dynamism: what is permanent in the flux of the movement.



Fig. 19 – Munari, Sketch 1938



Fig. 20 – Balla, Girl Who Runs on Balcony 1913

In interviews, Munari also repeatedly cited Enrico Prampolini, one of the most prominent names in the Futurist circle, as an inspirational figure for him. An artist who was far more up-to-date and aware of the wider international artistic scene than Marinetti. It was thanks to Prampolini that Munari embarked on some of his most innovative experimental activities, related to the so-called “polymaterial art”, which was a novelty in the European contexts of the early twentieth century, and which Prampolini extensively practiced and theorized since 1915.²⁰ This is clearly visible in his quite amusing work *ABCDadà*, in which Munari employs all sort of object to compose his dadaist spelling tables.

[Fig. 21]

²⁰ ‘Polymaterial art is not a technique but — like painting and sculpture — a basic and elementary means of artistic expression, whose evocative power is based on the plastic orchestration of different materials. Matter is to be understood both in its biological immanence and in its formal transcendence; it is, in its multi-expressive basic aspect, matter-as-object: from the most humble and diverse (almost a relict of life) to the most refined and elaborate (achieved both in a handcrafted and mechanical manner).’ (Prampolini 1944: 9).



Fig. 21 – Munari - ABC Dadà (Letter C)

In the light of Prampolini's early use of multiple techniques and materials, one can better understand the basis of Munari's *Manifesto of Machinism* (in itself a Futurist gesture), apparently penned in 1938 and published in 1952.

In the Manifesto he claimed, once again, that he wanted to abandon the traditional categories of painting and sculpture and move towards a closer relationship with technology, doing away with “romantic brushes, the dusty palette, the canvas and the easels”, in favour of new tools such as “the oxygen torch, chemical agents, chrome plating, oxidation, anodizing, thermal alterations” (Munari 1952).

However, like Prampolini, Munari had no ideological preference for the new materials produced by modern industry (like steel, rayon or plastic), as he was indifferent to the “Futurist” dimension of the materials to be used (Meneguzzo 1993: 8). He wanted to simply test the limits of traditional and new materials alike, in formal and constructive terms, both for sensorial and psychological

reasons. The materiality and texture of objects was a significant aspect of Munari's art, and this interest also prompted one of his most famous didactic experiments, the so-called "tactile laboratories" (*i laboratori tattili*), themselves an open tribute to the "tavole tattili" produced by Marinetti and Benedetta in the 1920s and to Marinetti's manifesto, *Il tattilismo* (1921) (Munari 1985: 4).

[Fig. 22]



Fig. 22 – Marinetti, Sudan – Parigi, Tavola Tattile 1920

Another important Futurist source of inspiration for Munari was the manifesto *Ricostruzione futurista dell'universo* (The Futurist Re-fashioning of the Universe, 1915), that can be considered one of the first theoretical texts of abstract art produced in Italy, signed by Giacomo Balla and Fortunato Depero. In *Ricostruzione futurista dell'universo* we can see Munari in a nutshell (Tanchis 1986, Raggiante 1962), for instance in the suggested use of lowly materials such as

strands of wire, cotton, wool, silk of every thickness and coloured glass, tissue paper, celluloid, metal netting, every sort of transparent and highly coloured material. Fabrics, mirrors, sheets of metal, coloured tinfoil, every sort of gaudy material. Mechanical and electrical devices; musical and noise-making elements, chemically luminous liquids of variable colours; springs, levers, tubes, etc. (Balla and Depero 1915: 198)

Balla and Depero's dynamic three-dimensional constructions (*complessi plastici dinamici*) point, in their technical affinities, towards Munari's "useless machines". The same could be said about the "rotoplastic noise fountain" (*fontana giroplastica rumoristica*), as Munari was going to build several fountains in the 1950s, for example the one that was placed in front of the book pavilion at the Venice Biennale of 1954, inspired by traditional Chinese water meters, or the large rotating fountain, with brightly coloured vertical blades, for the Fiera di Milano of 1955 (Munari 1971: 58-63).

Another element of continuity between Balla and Depero's manifesto and Munari's experimentation is the focus on toys, crafted in order to broaden children's sensitivity, imagination and physical dynamism — ideas that Munari developed and expanded in his widely praised "pedagogical artistic laboratories" for children. Moreover, in 1953, he designed for Pirelli what is possibly his most famous toy, *Zizi the Monkey*, made of foam rubber and wire and described by Meneguzzo and Finessi as "the world's first interactive sculpture" (Finessi Meneguzzo 2007: 99). Although this is an overstatement, because Zizi was essentially a toy, an industrially made toy.

Useless Machines

However, although there were evident elements of continuity in formal sense with the Futurist experience, it is also important to acknowledge the fact that when dealing with machines and their artistic conceptualization and representation, Munari was explicitly trying to do something radically different from the Futurist movement:

I overcame my Futurist phase because I became conscious of the fact that working in accordance with Futurist methods meant using static techniques to show dynamic things. Thus, back then, I came to realize that what the Futurists were doing was to freeze a specific moment of dynamism (Hajek 1999: 136).

For the same reason, he expressed a critique of Russolo's musical instruments, which he considered to be "cranky" machinery, "like big toys [...] they were simply wooden blocks, while I was more interested in something that changes its shape" (Hayek 1999: 138-39). [Fig. 23]



Fig. 23 – Russolo, Intonarumori

In fact, Munari was the first artist in Italy to clearly see the limits of traditional painting and sculpture, trying to open up the artistic work to a larger palette of technical and plastic possibilities.²¹ With the “useless machines”, he was interested in exploring the time-space continuum, and how to make a work of art that could interact with the environment and change accordingly. To make a work of art that it is *truly*, and constitutionally dynamic, outdoing on this score the Futurists themselves. In a sense Munari is the first Italian example and one the first in Europa of kinetic art, which became a dominant trend worldwide in the 50s and 60s. [Fig. 24]

²¹ Cfr. Luciano Caramel, Gli astratti, in *Gli Anni Trenta*, 151-74 (155).



Fig. 24 – Munari,
Useless Machine 1949

Munari’s “useless machines” should be also read as surreptitious ironic gestures against Futurism, more Dadaist in spirit than the grandiose machines, made of iron and steel that Marinetti and his fellow Futurists praised in their manifestos. Munari’s *macchine inutili* were built with very light materials like paper, thin wooden sticks and silk threads. The entire structure had to be “very light in order to be able to move in the air, and the silk thread was perfect for dispersing the torsion” (Munari *et al.* 2000: 38). [Fig. 25]

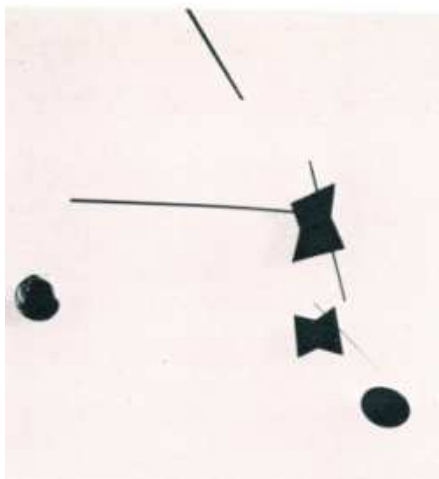


Fig. 25 – Munari
Useless Machine 1937

In the Anglo-American Art context Munari’s useless machines have gone down basically as forms of “mobiles”, in the tradition of Alexander Calder.

However, Munari was always critical about this reference: he emphasized that he conceived his useless machines pretty much in the same period as Calder, in the early 30s, and that they were quite different in nature. Both types of sculptures were hanging objects, but they were made of very different materials. Calder's were balanced wire armature from which sculptural elements, essentially metal plates, were suspended, while Munari construction were very light, made of thin paper or fabric. Also, Munari constructed abstract, geometrical contraptions in which all the elements were in harmonic relationship with each other, while Calder's mobiles had a "organic" inspiration and possessed the same structure as a tree: "Take a branch with its leaves and observe one of Calder's mobiles — they have the same principle, they have the same sway, the same dynamic behavior" (Munari *et al.* 2000: 40).] Munari's machines are structuralist and geometrical in principle and are based on scrupulous planning of physical and mathematical nature. [Fig. 26-27]



Fig. 26 – Calder, Steel Fish 1934

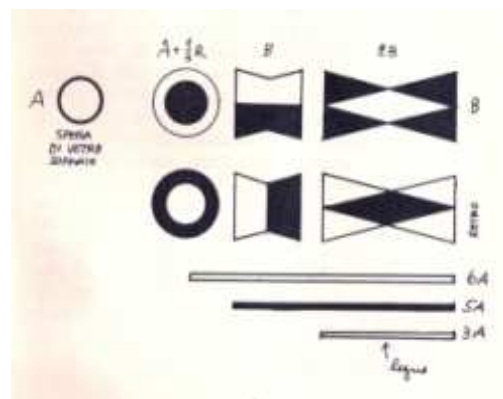


Fig. 27 – Munari, Useless Machine Project

As it happened abroad, Munari's machines did not receive much critical attention in Italy either:

Created in the midst of classical, monumental, heroic and 'granitic' *Novecento*, my 'useless machines' have always been considered a sort of joke [...]. They were not made of bronze or marble, as would be expected of true sculpture. They weren't even painted with oil colours, but finished with tempera. They were not to be hung on the walls like paintings, but from the ceiling like chandeliers. People didn't know how to classify them. (Munari in Finessi Meneguzzo 2007: 36)

Moreover, "in those days the *Novecento* art movement, with its solemn masters, reigned supreme. All art journals spoke of nothing but irrelevant artistic displays, and I, with my useless machines, was a laughing stock" (Munari 2000: 38). The *Novecento* movement was a conservative trend in the arts, endorsed and promoted by the art critic Margherita Sarfatti, an acolyte, lover and biographer of Mussolini. She demanded a return to more harmonic and classic forms of expression and opposed the radicalism of avant-garde or experimental art.

There was also a general ideological problem which differentiated Munari's work from the one of the so-called "secondo Futurismo", particularly in relation to the representation of technology. Despite the fact that many Fascist leaders saw in Futurism a form of "degenerate art", many members of the second wave of the Futurist movement operated within the ideological remits set by

the regime, relinquished their radical iconoclasm and subversive attitude, and yielded to the so-called “return to order” (*retour à l'ordre*). As the Italian historian Emilio Gentile wrote, the peculiar Italian modernist nationalism fostered by the régime in order to promote its cultural revolution did not resort to the rationalist tradition of the Enlightenment, but “to the energy of feelings and emotions; it sought to reactivate the mythopoetic faculties in order to create new and modern myths of the nation — a secular religion of the nation — to oppose the negative consequences and disgregatory effects of the crisis of traditional society” (Gentile 1994: 60-61). In order to compensate for the social tensions produced by industrialization, urbanization and technological innovations, the Fascists tried to infuse a heavy dose of “spiritualization” into the general discourse on modernity, as a sort of antidote to the “side-effects” of modernization. Therefore, discourses and representations of technology had to be constantly infused by *Geist und Seele* (spirit and soul), resulting in an oxymoronic rhetorical combination of rationalism and idealism, of material pragmatism and para-religious spirituality (Herf 1984: 16).

This was particularly visible in the conceptualization of technology by the second generation of Futurists. An early example was the *Manifesto of Futurist Mechanical Art*, published in a first version by Ivo Pannaggi and Vinicio Paladini in *La nuova Lacerba* (20 June 1922), and later edited and expanded, following Marinetti’s suggestions, by Enrico Prampolini and published in his review *Noi* in 1923. Here, the spiritual and ideal dimensions of technology is clearly visible:

WE FUTURISTS WANT:

1. that the spirit and not the exterior form of the machine be reproduced, creating compositions which employ all manner of expressive means as well as mechanical elements;
2. that these expressive means and mechanical elements be coordinated by an original lyrical canon, not a studied, scientific one;
3. that the essence of the machine be understood as its forces, rhythms and the infinite analogies which it suggests; that the machine conceived of in this manner become the source of inspiration for the evolution and development of the plastic arts. The Machine sings the song of the Genius. The Machine is the new goddess that illuminates, rules, gives her gift or punishes in our futurist times, which worship the great Religion of the New. (Paladini, Pannaggi, Prampolini 1923)

This spiritual drift in the understanding of technology was to become even more evident in the genre of Futurist aeropainting of the 1930s and its theoretical basis, a manifesto co-signed by Balla, Benedetta, Depero, Dottori, Fillia, Prampolini, Somenzi and Tato. Originally conceived to express the new “aerial visual perspective” produced by flight, aeropainting was eventually coupled with the emerging interest in sacral art and religious iconography, and developed into a kind of “cosmic idealism”, in which mystical elements became pervasive (Miracco 2004).²²

Technology as art and craft

Munari’s position was radically different, both from an ideological and epistemological standpoint. This becomes quite clear if we read his theoretical reflections on art and design, published after the Second World War, in books such as *Da cosa nasce cosa* (Things Born from Things, 1961),

²² This understanding was also theorized by Fillia in *L'idolo meccanico* in which he wrote: “L’arte non deve perciò limitarsi ad un puro problema di forma e colore (anche se costruiti meccanicamente) ma rendere lo SPIRITO della nostra vita. Il valore della MACCHINA assume moralmente una importanza incalcolabile, con la creazione di una NUOVA MORALE dove la macchina è azione e fine: interpretare questa spirituellizzazione meccanica è segnare l’inizio di un’ARTE SACRA moderna” Cited in Mario Verdone, *Teatro del tempo futurista*. Roma, Lerici, 1969, p. 299.

Arte come mestiere (Art as Profession, 1966), and *Artista e designer* (Artist and Designer, 1971). However, the basic epistemological assumptions of Munari's conception of art and technology, and their mutual interaction, were already present in his early works, starting from his *macchina aerea* (1930) and his first *macchine inutili* (1932).

It has to be remembered that when, in 1925, Munari moved to Milan, he worked for a year with one of his uncles who was an engineer. This, surely, had an influence on him, for it shaped his understanding of technology and developed his technical ability to manipulate mechanisms and materials. This is explicitly stated by Munari also regarding another of his uncles, Vittorio, who was a luthier:

I was going quite often to his studio to see how he bent the maple sheets to make the lateral curve of the violin [...] I loved to work with materials and with the tools of an artisan. I liked the smell and the texture of wood, the smell of the varnish [...] I liked to make things, to cut, to glue, to design. (Munari 1986: 74).

One should not underestimate the fact that Munari was possibly one of the few Futurists who had practical, hands-on experience of machines and machinery. Therefore it is not surprising that Munari considered his useless machines to be, very simply, and before anything else, *machines*, because they were built with several interconnected moving parts, and their movements were coordinated by levers which for Munari, was the most basic form of a machine, a sort of "first degree machine". Just like Leonardo's study

of machines started from basic forms like the screw, Munari's starting point was the simple geometric and dynamic principle that held different elements together in an organic, interconnected whole (Meneguzzo 1993: 125). As I said, all of Munari's projects were meticulously planned and designed before being actually executed. In spite of the many Dadaistic elements in his art, Munari's conceptualization of technology was basically structuralist, in the sense that his point of departure was always the limits and the constraints of a given technology and/or the given materials, considered as the very root of artistic invention:

The secret is that I always start from engineering, not from art. Many people start with an idea that they want to realize at all costs. That's not my method. If you start with the engineering, you know how far you can go. An industry has specific technologies and techniques, so you try and make something different with what you have to work with [...]; this is the essence of creativity. (Munari 1993: 106)²³

Such considerations move in the opposite direction to the anarchic genius Marinetti and his fellow Futurists saw as the source and driving force of the technological imagination. For Munari, technology was not an ideal or a myth but in the first instance an instrument. Also, he never tried to impose any

²³ “io parto sempre dalla tecnica, non dall'arte. Molti partono da un'idea, e poi la fanno realizzare a tutti i costi. Non è il mio metodo. Se parti dalla tecnica, sai fino a dove puoi arrivare: un'industria ha tecniche e tecnologie precise, così tu cerchi di fare con quei dati che hai a disposizione qualcosa di diverso [...] questa è l'essenza della creatività. Con quelle capacità tecniche, e con la tua curiosità, fai il progetto, e sai in anticipo se si può fare.”

abstract or ideas onto his technicians, but always sought their collaboration, by making any object, any work of art, “on the field”, working alongside with people who used these technologies in their everyday trade (Munari 1993: 106). As the Italian critic and curator, Marco Meneguzzo pointed out:

Munari approaches technology — any form of technology — with that mental disposition that etymologically could be called ingenuity: it is from the custodians of machines, from the employers and workers, who know them as real instruments and not as production data on the drawing board, that Munari, as a designer, seeks information, even on their malfunctions.

(Meneguzzo 1993: 23)

So, here we can find the root of Munari’s formalism, often derived from technological solutions. For him, there was no distinction between “pure art” and “applied art”. In the spirit of the democratic and anti-elitist ethos of the Bauhaus, Munari thought that “‘beautiful’ is what is ‘right’. Any good project produces a beautiful object” (Munari 1966: 31). Munari wanted to deconstruct the romantic notion of the artist as genius, of art as inspiration, which still pervaded much of Futurist rhetoric. Instead, he favoured an active, pragmatic and ethical engagement with art, resorting to a vocabulary that was quite at odds with the majority of Futurist theorization:

We ought to demolish the myth of the artist as a star, who only makes masterpieces for intelligent people [...] The artist should relinquish any romantic aspects of his art to become an active

man among other men; someone who is informed about present technologies, materials and working methods; someone who, without abandoning his instinctive aesthetic sensitivity, would respond with humbleness and competence to the questions that his fellow human beings will ask him. (Munari 1966: 19)²⁴

There is also another important epistemological element that deserves to be noted. Munari's machines are "useless" because "unlike other machines, they don't produce consumer goods, they don't make workforces obsolete and don't contribute to the growth of wealth or capital" (Munari 1966: 15).

Munari argued the same with regard to the so-called "a-rhythmic machines" which he constructed in the 1950s, and with which he further explored the idea of *useless and unproductive functioning and mechanism*:

Their movements "are released by regular and rhythmically functioning mechanism and that serve to maintain regular mechanical running, discharging excessive energy from the machine". The idea was to make "fortuitous" energy "act by encouraging a-rhythmic movements [...] so as to make the functioning of a machine less regular, especially if its functioning is totally useless and unproductive" (Tanchis 1986: 33). [Fig. 28]

²⁴ « Il sogno dell'artista è comunque quello di arrivare al Museo, mentre il sogno del designer è quello di arrivare ai mercati regionali. » (Bruno Munari, *Artista e designer*, 1971)



Fig. 28 – Munari
A-rhythmic Machine, 1951

Munari further explored his interest in the playful and gratuitous dimensions of technology with his *macchine umoristiche*, twelve “amusing machines” that he published in book format with Einaudi in 1942, like a mechanism to tame alarm clocks; a machine to smell artificial flowers; a lizard-propelled engine for lazy turtles; a mechanism to play the flute even when one is not at home, and so on (Munari 2001). [Fig. 29]

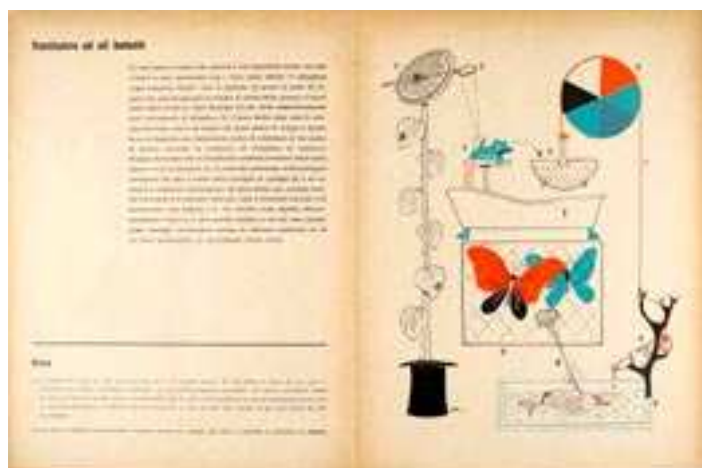
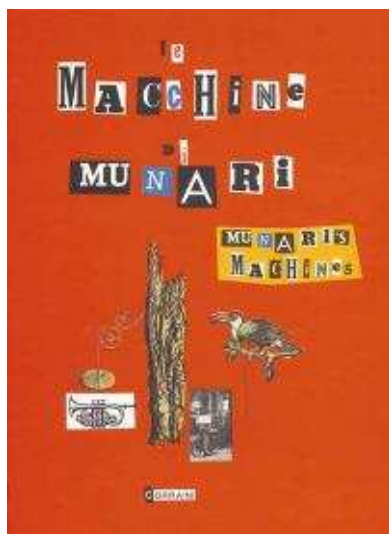


Fig. 29 – Amusing Machine 1942

Leonardo Sinisgalli, a poet and engineer who, in the 1950s, was the editor of one of the most prestigious industrial magazine of post-war Italy, *Civiltà delle macchine*, explicitly praised Munari, listing his work within a whole genealogy of fantastic and comical machinery: from the surreal work of Raymond Roussel to the amphibian and absurd machines of Francis Picabia; from the comical illustrations of Rowland Emmet to Franz Kafka's "optimistic" nightmares, like the Odradek in *Die Sorge des Hausvaters* (The Worries of a Family Man) or the bizarre machinery of *In der Strafkolonie* (In the Penal Colony) (Sinisgalli 1954, 1956; Mucci 1955). According to Alessandro Prampolini, Enrico's brother, the true merit of artists like Picabia or Munari was to bring machines back to the "syntax of poetical emotions", from which they were unjustly excluded, because they have been always conceptualized "under the umbrella of utilitarian contingencies" (Orazi 1955: 76-77).

By placing the machine within a gratuitous realm not subject to economic rationality, Munari seems to present a sort of surreptitious pseudo-Marxist critique of the capitalist use of technology and of "surplus value".

However, Munari never questioned the relationship between art and the capitalistic means of production in ideological terms. Actually, he saw technology and industrialized mass production as an instrument for cultural emancipation rather than alienation:

If we want to arrive at an art made by everybody (which is not the same as an art made for everybody), we need to find the instruments to facilitate artistic production and, at the same time, to train everybody and provide them with a production methodology. Bourgeois Art with a capital A, handmade by a Genius only for rich people, makes no sense in our age; Art for everybody is still this kind of art but cheaper: it still bears the imprint of the Genius, while

leaving everybody else with a sense of inferiority. The technological possibilities of our age allow everybody to produce something with an aesthetic value; allow everyone who got rid of his/her inferiority complex to put his/her creativity, humiliated for far too long, into action. (Munari 1971: 105)²⁵

Natural Art

A final interesting element in Munari's epistemology, which truly makes him a Leonardo of modern times, is the intrinsic monism in his understanding of the relationship between technology and nature — which is the opposite of the spiritual, religious and cosmic drift dominant in Futurist art of the 1920s and 30s. For him, there was no dualistic separation between nature and technology, between the artificial and the natural. In his view, both are nothing but segments on the same continuity. Again, this idea was explicitly conceptualized by Munari mainly from the early 60s, however there were already in his early production clear evidence of this kind of understanding. I'll give few examples:

Already in the illustrations for Marinetti's book, *The Poem of the Milk Dress* (1937), Munari juxtaposed human digestive organs with industrial boilers; the flow of milk with the flow of aerial squadrons; natural elements like wood, clouds, flowers and butterflies with machines; traditional hand milking mechanical one. Munari is clearly interested in conveying the idea of

²⁵ Munari's idea of technology move clearly against the understanding, that became so dominant in twentieth century philosophy — take for instance Martin Heidegger, Karl Jaspers or Gunther Arehns' philosophy —, according to which technology is a superimposed form of teleological rationality that escapes human control. Very much in the spirit of Norbert Wiener's concept of "creative invention" (Wiener 1994), Munari pursued the idea that technical and artistic innovation are not so rational, after all. They are often the product of chance, of contingent and unpredictable conditions: "Reason and calculus will surely be used to give shape to this four-dimensional object, but the general idea emerged by chance, from sensorial receptors, from contextual conditions, from food, light, health, temperature. Art emerges when one doesn't know what one is doing" (Munari, in Bellasi 2004: 33).

transformation, of the passage from the natural to the artificial, which is tied to his epistemological perspective of an intrinsic continuity between nature and technology.

This attitude it is also visible in the “amphibological” montages of the 30s, such as “Ci porremmo dunque in cerca di una femmina d’aeroplano” (1936), in which a woman is represented as a ‘technological mermaid’, with an aeroplane tail; or in “All’ora l’aeroplano era fatto di bambù e tela” (1936), in which the wings, the propeller and the horizontal stabilizer of an airplane are made of butterfly wings (Becker 2008: 72-73). The title makes a direct reference to the famous Leonardo’s project of flying machines, indeed made out of wood and sails. [Fig. 30-31]



Fig. 30 – Munari, and thus we would set about seeking an aeroplane woman 1936



Fig. 31 – Munari, in those days the aeroplane was made of bamboo and canvas 1936

Other examples are the *Fossili del 2000* [Fossils for the third Millenium] Already in 1959, when Italy was at the height of its economic boom, Munari was thinking about the future obsolescence of a number of industrial

components such as thermoionic valves. The outcome of this thinking and of his observation was this box of perspex bricks which could serve as the amber of the next millennium. They almost look like insects, technological insects. This idea is somehow replicated in the *Kamasutra delle rane* [Frogs' Kamasutra], in which Munari stripped away the plastic shell of two toy frogs which are left only with their mechanical skeleton. [Fig. 32]

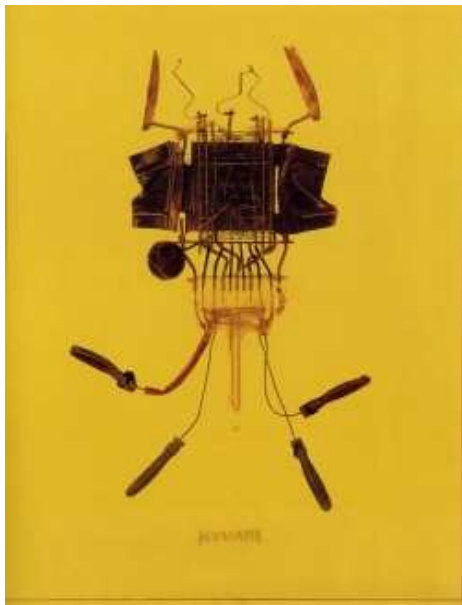


Fig. 32 – Munari
Fossils for the third Millenium 1959

Very much like Leonardo's, many of Munari's ventures started off with an observation of nature, which provided the defining elements of intrinsic organicity and unity to the project under hand (Munari 1966: 6). Nature is flexible, adaptable, able to produce an infinite variety of forms, starting from a few given elements. That's why in his booklet titled *Good design* (1963) he makes reference to the orange and to green peas as a perfect example of natural ingeneous design, that the humans should imitate. With a slightly tongue-in-cheek tone he explains the orange's and the pees' structure as they were industrial design projects:

This object consists of a series of modular, three-dimensional segments grouped vertically around a central axis. [...] The segments come wrapped in highly sophisticated package, both in terms of material and colour. It is quite hard on the outside surface and covered with a soft inner lining of protection that lies between the outside and the ensemble of the containers.²⁶

And with pees:

Food pills of various diameters, packing in double valve cases, very elegant in form, color, material, semi-transparent and easy to open. The case as well as the product itself, and adhesive as well all come from the same production center. Therefore, there are no different methods of working on different materials to mount in a successive phase of finishing, but an extremely exact work program that is certainly the fruit of highly specialized teamwork.²⁷

The same applies to 1978 *Disegnare un albero* [*How to draw a tree*], in which Munari explores the laws of growth of natural forms by the means of drawing, in a way that resembles the 1917 D'Arcy Thompson's book *On Growth and Form*. This is the root of the spontaneous empiricism so typical of Munari's method: thought itself, he claimed, comes from nature and from the observation of its structures and laws (Munari 1997: 104).

This is possibly the reason why, when discussing the principles of “form following function” — one of the key principle of twentieth-century industrial

²⁶ Good design, p. 12

²⁷ Good design, p. 20

design and modern architecture — Munari does not refer to John Sullivan, one of the fathers of American modernism, who allegedly coined the phrase, or to the Bauhaus theorization which extensively applied this basic principle to industrial design, but to the French biologist Jean-Baptiste Lamarck (Munari 1966: 29).²⁸ For Munari, the integration of art and technology in the modern world could be achieved by returning to their organic unity with natural principles, so that in the end they may become an effective, life enhancing part of our everyday human existence.

²⁸ From an epistemological standpoint, Munari's reference to Lamarck is quite different from Marinetti's, who quoted the French biologist in "L'uomo moltiplicato e il regno della macchina", included in *Guerra sola igiene del mondo* (1915): "Certo è che ammettendo l'ipotesi trasformista di Lamarck, si deve riconoscere che noi aspiriamo alla creazione di un tipo non umano nel quale saranno aboliti il dolore morale, la bontà, l'affetto e l'ampore" (Marinetti 1915: 299). While in Marinetti, the theory of adaptation proposed by Lamarck is interpreted (or rather *misinterpreted*) factually — resorting to an evolutionary theory that was by that time already widely rejected in favour of Darwinism, Munari's understanding of this concept is analogical, resorting to a parallelism between natural and technical basic principles of formal growth.

Bibliography

- Apollonio, Umbro. 1973. *Futurist Manifestos*. London: Thames and Hudson.
- Balla, Giacomo and Fortunato Depero. 1915. *Ricostruzione Futurista dell'universo*. Milano: Direzione del Movimento Futurista. English translation in Apollonio 1973: 197-200.
- Becker, Luz. 2008. *Cut & Past: European Photomontage 1920-1945*. Roma: Gangemi.
- Bellasi, Pietro. 2004. 'Il cogito del sognatore di macchine' in Corrà, Bruno *et al.* (eds.) *Tinguely e Munari: Opere in azione*. Milano: Mazzotta.
- Bianchino, Gloria (ed.) 2008. *Bruno Munari: Il disegno, il design*. Mantova: Corraini.
- Cambiasi, Lyana. 1929. 'Fra due mantelli' in *Lidel* 8: 22-23.
- Caramel, Luciano. 1982. 'Gli astratti. Tra idea e prassi' in *Gli Annitrenta: Arte e cultura in Italia*, Exhibition catalogue. Milano: Palazzo Reale: 151-158.
- D'Albisola, Tullio. 1934. *L'anguria lirica*. Savona: Edizioni futuriste di 'Poesia'.
- Dorfles, Gillo. 1999. 'Capriole lessicali' in Finessi 1999: 192.
- Finessi, Beppe (ed.) 1999. *Su Munari: 104 testimonianze, 152 inediti di Bruno Munari*. Milano: Abitare Segesta.
- Finessi, Beppe and Marco Meneguzzo. 2007. *Bruno Munari*. Cinisello Balsamo: Silvana.
- Gentile, Emilio. 1994. 'The Conquest of Modernity: From Modernist Nationalism to Fascism' in *Modernism/Modernity* 1 (3): 55-87.
- Goretti, Maria. 1942. *Poesia della macchina: Saggio di filosofia del futurismo*. Roma: Edizioni futuriste di 'Poesia'.
- Hajek, Miroslava. 1999. 'Nello spazio: Intervista a Bruno Munari' in Finessi 1999: 136-39.
- Herf, Jeffrey. 1984. *Reactionary Modernism: Technology, Culture, and Politics in Weimar and the Third Reich*. Cambridge: Cambridge University Press.
- Lista, Giovanni (ed.) 1992. *Enrico Prampolini: Carteggio futurista*. Roma: Carte Segrete.
- Lista, Giovanni. 2001. *Futurism*. Paris: Terrail.
- Marinetti, Filippo Tommaso. 1915. *Guerra sola igiene del mondo* in *Teoria e invenzione futurista* (ed. Luciano De Maria). Milano: Mondadori, 1968: 235-341.
- . 1929. 'La mostra futurista a Milano' in *La rivista illustrata del Popolo d'Italia* VIII (11): 54-57.

- . 1929-1930. 'Il suggeritore nudo. Simultaneità futurista in undici sintesi' in *Comoedia: Rassegna mensile del teatro* 11-12: 38-44.
- . 1937. *Il poema del vestito di latte*. Milano: Officine Grafiche Esperia.
- Meneguzzo, Marco. 1993. *Bruno Munari*. Roma-Bari: Laterza.
- . 1995. *Bruno Munari: Opere 1930-1995*. Bergamo: Fumagalli.
- Miracco, Renato (ed.) 2004. *Futurist Skies: Italian Aeropainting*. Milano: Mazzotta.
- Morgagni, Manlio. 1929. 'Un pittore futurista: Munari' in *La rivista illustrata del Popolo d'Italia* 7: 57.
- Mucci, Renato. 1955. 'Fanta-tecnica del dott. Pawlowski' in *Civiltà delle macchine* 6: 44-45.
- Munari, Bruno. 1942. *Le macchine di Munari*. Mantova: Corraini, 1999.
- . 1952. 'Manifesto del macchinismo' in *Arte concreta* 10.
- . 1966. *Arte come mestiere*. Roma-Bari: Laterza. Reprinted in 1969, 1970, 1972, 1973, 1975, 1977, 1981, 1986, 1989, 1991, 1997, 1999, 2001, 2003, 2005, 2006, 2007.
- Spanish translation *El arte como oficio*. Barcelona: Labor, 1968. English translation *Design as art*. Harmondsworth: Penguin, 1971. Portuguese translation *A arte como oficio*. Lisboa: Presença, 1978.
- . 1971. *Codice ovvio* (ed. Paolo Fossati). Torino: Einaudi.
- . 1985. *I laboratori tattili*. Mantova: Corraini.
- . 1986. 'Munari interroga Munari in occasione della mostra milanese a Palazzo Reale Munari e Munari' in *Domus* 677: 74-79.
- . 1993. 'Tecnica per usare la tecnica' in Marco Meneguzzo, *Bruno Munari*. Roma-Bari: Laterza: 101-118.
- Munari, Bruno, Claude Lichtenstein and Alfredo W. Häberli. 2000. *Far vedere L'aria: A Visual Reader on Bruno Munari*. Berlin: Springer.
- Orazi, Vittorio. 1955. 'Le macchine liriche di Picabia' in *Civiltà delle macchine* 4: 76-77.
- Paladini, Vinicio, Ivo Pannaggi and Enrico Prampolini. 1923. 'L'arte meccanica futurista' in *Noi*, series II, 1(2), March 1923: 1-2; reprinted in Crispolti, Enrico (ed.) *Pannaggi e l'arte meccanica futurista*. Milano: Mazzotta, 1995: 175.
- Pizzi, Katia. 2008. 'Of Men and Machines: Pannaggi, Paladini and the "Manifesto of Mechanical Art"' in *The Italianist* 28: 217-226.
- Platone, Augusto. 1941. *L'uomo e la macchina*. Roma: Edizioni futuriste di 'Poesia'.
- Pontiggia, Elena. 1988. *Il Milione e l'astrattismo, 1932-1938*. Milano: Electa.
- Prampolini, Enrico. 1944. *Arte polimaterica*. Roma: Edizioni del Secolo. Reprinted in Calvesi, Maurizio, Siligato Rossella and Pinottini Marzio (eds.) *L'avventura della*

- materia: Der italienische Weg vom Futurism zum Laser*. Milano: Mazzotta, 2001.
- Quintavalle, Carlo Arturo. 1979. 'Intervista a Bruno Munari' in *Bianchino* 2008: 34-39.
- Raggianti, Ludovico. 1962. 'Munari e la fantasia esatta' in *Comunità* 100.
- Ricas, Riccardo. 1999. 'Via Carlo Ravizza 14' in *Finessi* 1999: 63.
- Rizzi, Alexia and Miroslava Hajek. 2007 'La verità del Leonardo del XX secolo – seconda parte' in *Graphicus* 1043: 88-89.
- Sinigalli, Leonardo. 1954. 'Macchine comiche' in *Civiltà delle macchine* 1: 45.
- . 1956. 'Macchine di Franz Kafka' in *Civiltà delle macchine* 4: 38-41.
- Solimano, Sandra. 1997. 'Futurismo e astrazione italiana fra le due guerre' in Crispolti, Enrico and Sborgi, Franco (eds.) *Futurismo. I grandi temi 1909-1944*. Milano: Mazzotta: 58-63.
- Tanchis, Aldo. 1986. *Bruno Munari: From Futurism to Post-industrial Design*. London: Lund Humphries.
- Wiener, Norbert. 1994. *Invention: The Care and Feeding of Ideas*. Cambridge, MA: MIT Press.