Arte Programmata.

The Role of Programming and Observer Engagement in 1960s Italian Programmed and Kinetic Art

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Abstract: Arte Programmata. The Role of Programming and Observer Engagement in 1960s Italian Programmed and Kinetic Art

The Arte Programmata movement developed in Italy between 1959 and 1965 and it can be considered the Italian response to the international debate developed in those years on the role of kinetics – real or apparent – in art history, as well as on the observer's reaction to, and interaction with the artistic object. This Italian movement arose thanks to the active research of two different groups: Gruppo T in Milan and Gruppo N in Padua. These two groups had profound divergences about the different stylistic choices adopted, the influences received by the surrounding artistic context, and the methodological approach to the idea of kinetics. However, they both shared a sincere interest for an innovative type of art which directly acknowledged the role of the observer within the artistic experience. The two groups promoted a rational and scientific attitude to the artistic experimentation, embodying the concept of artists as 'aesthetic operators' whose research focusses on the study of the observer's cognitive response, on the didactic role of their artworks, and on the communicative purpose of the artistic programming activity. They privileged the idea of art as a team effort rather than an exaltation of an individual artist's style: the creation process and the mode of designing of the work of art were the real highlights of their artworks.

The programming activity is, indeed, the true cornerstone of this artistic avant-garde: the process of planning the physical, kinetic, and, above all, interactive features of the artwork becomes its primary, fundamental worth. Consequently, the artist's focus is not the uniqueness of the object per se anymore – since almost every modern artwork is replicable thanks to modern industrial techniques – but rather the acknowledgement of its aesthetic and semiotic qualities that are included in the information that is conveyed to the observer by carefully programming one's interaction with the artwork.

This dissertation aims to investigate this artistic movement with specific attention to the brief but intense display season that characterised its short lifespan. It will also investigate its origins, as well as dissect the role and influence of various national and international avant-garde movements in its evolution. The major spotlight of this study will be the dialogue between the artwork and its observer, and the role of programming in directing this complex relationship. This research will also scrutinize the concept of programming and its internal dichotomy between rationality and chance. Moreover, this study will delineate and define programming from an aesthetic standpoint, as well as highlight its purpose and role as a fundamental semiotic resource for the analysis of the interaction

between the artwork and the observer. The *open work* theory by Umberto Eco and the idea of 'correality' theorized by philosopher Max Bense can be considered the two staple elements that give structure to this dissertation whilst also providing an innovative, modal approach that integrates and completes a pure historic-artistic methodology.

Declaration of Authorship

I **Martina Borghi** hereby declare that this thesis and the work presented in it is entirely my own. Where I have consulted the work of others, this is always clearly stated.

Signed:

Date: **16th of March 2022**

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Introduction: Art as Research

1. How the Artwork Communicates: The New Focus of the Artistic Tendences of the 1960s

In 1965, on the occasion of the exhibition 'Nova Tendencija 3' in Zagreb, critic and art historian Giulio Carlo Argan (1909–1992) wrote a text entitled 'Arte come Ricerca' in which he analysed and presented a new approach adopted by art trends of the period throughout Europe. What the critic pointed the attention to is the fact that this approach was based on the idea of art as an act of research. It immediately stands out how, from the very first lines of the text, Argan focuses on the idea of research as a special *mode* of the art activity: the way in which the art experience is conducted and organized is an act of research.[1] The rational approach that characterises scientific disciplines was thus closely integrated with the idea of art: the art activity could not be linked with the stable idea of knowledge anymore, but rather with the dynamic and evolving idea of research. Argan underlines the fact that art was then considered a dynamic and open system that adopted different methodological criteria borrowed from different disciplines and fields. Art could be considered a form of research precisely because it offered to different fields of knowledge the possibility to influence each other:

> L'idea che l'arte sia ricerca si profila quando l'arte non è più stabilmente inserita in un sistema del sapere, anzi quando il sapere stesso non viene più concepito come un sistema chiuso e unitario, ma come un fascio di ricerche condotte, con diversi criteri metodologici, in diversi campi.[2]

Therefore, as for any other kind of research, the mode of organizing the artwork is what primarily matters, not the art content itself. By adapting the way of being and acting of the work of art to the rational approach of research, Argan underlines how art itself sets the goal of creating new values and bonds.[3] Still considering the mode in which art acts, therefore, the true aim of art as an act of research can be defined as the focus on the methodological process of research itself, how research

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[1] 'Il fatto che il concetto di ricerca, come modo proprio dell'attività artistica, valga per taluni periodi storici…'. Giulio Carlo Argan, 'Arte come ricerca', in *Nova Tendencija 3* (Zagreb: Galerija Suvremene Umjetnosti, 1965), pp. 19-22 (p. 19), catalogue of the exhibition.

[2] Ibid.

[3] 'La differenza sostanziale tra arte di ricerca e arte non di ricerca sembra dunque risiedere nel fatto che […] la prima tende alla determinazione di valori e, anzi, di se stessa come valore'. Ibid.

is conducted and developed. The process follows the artist's thinking model and way of working: an artwork can, therefore, be defined as the 'phenomenalization' of the research processes adopted by artists for their investigation. When analysing the art experience under this particular lens, it becomes clear that – according to Argan – materials, shapes and technology are all simple elements of the ongoing aesthetic research: they provide, in fact, practical help for the occurrence of the artist's hypotheses.

If the physical product of the art research is not the priority of the artist – who instead prefers to focus on the process that leads to a particular product – the recipients of the art experience become as important and valuable as the mode: they have to be aware of the art processes at the basis of their experiences and in turn be involved in them. The act of research, therefore, acquires an undeniable social value: we witness the observer's appropriation of a new role that is no longer 'vertical', but 'horizontal', a relationship of equal communication and awareness between the artists' research and the recipient of their experimentations.[4] Thanks to this new bond observers are no longer subordinated to a knowledge delivered to them promptly in a unidirectional way, but they are, instead, part of an open, verifiable, objective relationship that involves the artist, the art object as the proof of a mode of researching and provoking art reflections, and the observer.

Given these premises, although many different European experiences could be involved in this analysis on the new approach of contemporary art and its relative researching and communicative values, the aim of this investigation is to concentrate and limit the discussion to the Italian territory, highlighting the national peculiarities that emerged as a result of this new concept. To undertake this reflection, the collective phase of the Italian art movement Arte Programmata will be analysed with a specific focus on Gruppo T and Gruppo N: the idea is to focus on the period when the movement developed its multifaceted and varied formal and stylistic independence compared to other trends in Europe, that is to say approximately between 1959 and 1965. This trend was born in the context of an international avant-garde reflection on the idea of kinetics undertaken in those years, but it will be investigated with a specific reflection on the role of the observers. The planned analysis, then, aims to validate and justify Umberto Eco's claim:

Così paradossalmente, mentre si crede che l'avanguardia artistica non abbia un rapporto con
la comunità degli altri uomini tra i quali vive, e si ritiene che l'arte tradizionale lo conservi,

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[4] See Emanuele Quinz, 'From Program to Behavior: The Experience of Arte Programmata in Italy, 1958-68', in *Practicable, From Participation to Interaction in Contemporary Art*, ed. by Samuel Bianchini and Erik Verhagen, 10th edn (Cambridge, Massachusetts: The MIT Press, 2016), pp. 91-111 (p. 96).

in realtà accade il contrario: arroccata al limite estremo della comunicabilità, l'avanguardia artistica è l'unica a intrattenere un rapporto di significazione col mondo in cui vive.[5]

The reference to the 'rapporto di significazione col mondo in cui vive' represents the preeminent element for the main reflections that will be carried out in this thesis. As it will be fully explained below, the socio-cultural context of this selected period, influenced by the concomitant technological and scientific developments, was an incredible source of inspiration for Arte Programmata artists who exploited the communicative methods of the modern era to programme and to create art. It is crucial to ask on what basis, then, the Italian artists set up their work to establish this relationship of signification. Their attention was mainly focused on two aspects: on the mode in which the art experience was conducted and on the relationship with the recipient of it. Both factors were crucial for them to understand and dialogue with the context and the surrounding reality, and indeed both will be taken into account for the development of this dissertation.

2. Purposes of the Research and the Importance of an Innovative Theoretical Framework

The observer's engagement and the role played by the programming activity are two features strongly interdependent with each other, and it is impossible to discuss the former without considering the latter. Through different types of sources – amongst which the analysis of many works of art and the direct written testimonies of the artists involved stand out as primary one – this dissertation plans to shine a light on what programmed artists meant for 'the observer's engagement'. The investigation will include an in-depth analysis on how the observer's engagement was researched from a theoretical and practical viewpoint and, most importantly, what was the purpose of that involvement. The subsequent purpose of this research is the unveiling of the idea of programming. To define this concept and its nature it is necessary to focus on the role of programming itself in the relationship between the work of art and the observer as well as on how programming requires the observer's direct involvement to justify its existence and function. Whether the peculiar features and functions of the programming activity will emerge through the analysis of numerous programmed works of art and various programmatic texts, the most ground-breaking aspect of this dissertation is represented by the methodological approach chosen to define the concept of programming at a theoretical level.

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[5] Umberto Eco, *Opera aperta. Forma e indeterminazione nelle poetiche contemporanee*, 6th edn (Milan: Bompiani, 2004), p. 264.

The theoretical framework is based on three major reference points: the theory of *open work* by Umberto Eco (1932–2016), the semiotic concept of 'mode' and the aesthetic model of 'correality' theorised by philosopher Max Bense (1910–1990). The goal is to establish the essence of programming as a communicative system chosen by programmed artists, more precisely as a structure that communicates with the observer through the same impact and the same language that characterised the historical situation of that time. The purpose of this dissertation is then to define programming as an essential and operational semiotic resource directed at connecting the work of art to the observer from a rational point of view. To set up this complex reflection it will be necessary to introduce the comparison and the equivalence between programming and the Bensian concept of 'correality' and the reason why this link is noteworthy for the purposes of this research. Indeed, although programmed artists never directly advocated Bense's theories, their research clearly falls within the theoretical framework set by the German philosopher. My goal in this dissertation is to let all the possible artwork's features that exceed the ordinary material and physical ones emerge, as well as the role of programming as a form of 'correality', that is to say a type of alternative reality for the artwork, in other words, its way of being and working, its aesthetic and semiotic reality.[6] A new reflection therefore arises: the possibility that an aesthetic perception of the art object is privileged over the physical reality of it. This attitude can favour, as we shall see, a more rational and accurate perceptual and rational analysis of the art experience.

The focus on the mode of being of an art object requires, hence, a basic clarification on the very concept of mode: a mode can in fact be defined as a semiotic resource which allows the simultaneous realisation of discourses and types of interaction.[7] The mode is laden with communicative significance and, as a consequence, produces meaning in a social context.[8] The attempt of programmed artists to overcome the subjective and metaphysical value of the work of art to promote, instead, an approach that was rationally accessible thanks to scientific criteria will be thoroughly analysed using this modal approach. In this context, the idea of 'correality' as 'modo fondamentale dell'essere artistico' will be crucial to focus on the ways of production of aesthetic contents which the material object derives from.[9]

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[6] Max Bense, *Estetica*, ed. by Giovanni Anceschi (Milan: Bompiani, 1974), pp. 45-6.

[7] Crispin Thurlow, 'Multimodality, materiality and everyday textualities: The sensuous stuff of status', in *Handbook of Intermediality: Literature, Image, Sound, Music*, ed. by Gabriele Rippl (Frankfurt am Main: DeGruyter, 2015), pp. 619-636 (p. 623). For a detailed definition of mode see also Gunther Kress and Theo Van Leewan, *Multimodal Discourse: The Modes and Media of Contemporary Communication* (London: Arnold, 2001) and *Media Borders, Multimodality and Intermediality*, ed. by Lars Elleström (London: Palgrave Macmillan, 2010).

[8] Thurlow, p. 622 and Elleström, p. 14.

[9] Giangiorgio Pasqualotto, *Avanguardia e tecnologia: Walter Benjamin, Max Bense e i problemi dell'estetica tecnologica*, (Rome: Officina Edizioni, 1971), p. 10.

This innovative point of view adopted for the analysis of Arte Programmata is further motivated by the research carried out in recent years in the field of Italian Cultural Studies for the promotion of intermedial and interdisciplinary perspectives to approach hybrid objects and artistic movements that have so far been overlooked due to a perceived marginality brought upon by their in-between nature, straddling different artistic field and disciplinary framework.[10] This research, therefore, fits well in the analysis of a period, such as the Sixties, characterized by hybrid contaminations where, as we shall see in Chapter 1, we witness the rising bond between scientific and art disciplines, that strongly stimulates boundary-crossing experimentations permeating multiple disciplines at the same time.

3. Methods and the Difficulties of a Complex Approach: the Lack of Accurate Sources

The analysis of the term 'programming' can be easily accomplished due to the presence of numerous primary sources such as the writings of programmed artists, Bense's theories, and works of art from which some important deductions can be directly drawn. Nevertheless, the role played by the observer cannot be investigated with the same level of certainty and clarity. As we will see in more details, when dissecting the programmatic texts of the art groups under analysis, the observers do appear to be the crucial component of their research, and observers' participation and engagement in the art experience is the raison d'être of the same theory of programming. Having said that, an analysis that focuses on the artist/observer relationship, with particular emphasis on the artist's viewpoint, is simpler to structure rather than one focused on the observer's viewpoint. Through artists' writings and critics' opinions, programmed artists' commitment for the promotion of a type of art that communicates with the observers and develops a relationship with them – characterized by a didactic and playful approach – will be validated within the development of the thesis. This dissertation will therefore prove to be a valid tool to define and clarify this bond. The point of view of those who receive these stimulations is much more difficult to enquire for multiple reasons that will be briefly summarized below and that will emerge throughout the thesis with the aim to raise noteworthy reflections about this issue.

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[10] 'From the last years of the nineteenth century when cinema emerged, itself a hybrid practice, to the growth of performance art (art, literary expression, music, theatrical performance), from the computer-generated poetry of the 1960s, to the post-Internet developments, such as blogs and the cellphone novel, digital visual poetry, and sound art, there has been an explosion of new hybrid genres and art forms'. See Clodagh Brook, Florian Mussgnug, Giuliana Pieri, 'Italian Studies: An Interdisciplinary Perspective', Italian Studies, 4 (2017), 380-392 (p. 382).

The first reason that leads us to support this consideration is the lack of appropriate sources that directly testify the real interaction of the observer during exhibitions and events where these works were displayed. The scarcity of video material is very limiting to carry out a truly complete analysis of this movement. Being able to investigate in detail how visitors physically and emotionally engaged with the interactive artworks in front of them would be a great help in studying the influence of Arte Programmata on people. The photographic material in our possession fails to do justice to what looks like a complex set of interactions; a video source could have provided important clues. I am referring, above all, to the relationship between the observer and the work of art as well as between the observers themselves within the same exhibition space. As we shall see later, Arte Programmata works are greatly characterized by an industrial and mechanical aesthetic totally detached from a more traditional concept of work of art – like figurative paintings and sculptures – which was predominantly appreciated at the time, especially because of the influence in choices and tastes of mass media. For this reason the observer's approach and reactions appear even more crucial to investigate.

The second reason is therefore mainly related to the role of mass media in Italy between the 1950s and 1960s. The difficulties of the observer's viewpoint are exacerbated by the fact that, in general, the press of the time – with particular reference to weekly and monthly magazines as well as newspapers – was not particularly favourable and did not see the contemporary abstract or avant-garde trends of the period in a good light, often using a narrow lens that took a merely oppositional stance through the use of numerous stereotypes and an extremely ironic approach. Given this conflicting context, the chronicles of events, exhibitions, and public occasions in which visitors found themselves interacting with programmed works of art cannot be considered reliable, but partial and prejudiced with the intent to provoke the reaction and attention of the reader.[11]

During this period modern art novelties, collecting, art critics as well as the real cult for some prominent artists occupied the pages of magazines and periodicals read by thousands of people often totally devoid of any specific knowledge of the complexity of the world of art. Concerning the method that magazines chose to present these topics it is necessary to clarify the jarring dichotomy between two almost opposite approaches. On the one hand, periodicals tried to bring the public closer to the art environment with informative columns and a surreptitiously didactic purpose. On the other hand,

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[11] For this type of research, newspapers such as *La Stampa*, *Il Corriere della Sera*, *Avanti!*, *Il Gazzettino* and numerous weekly or monthly magazines such as *Oggi*, *Le Ore*, *L'Espresso*, *L'Osservatore Romano*, *L'Europeo*, *Amicizia* were consulted. A valid help in this regard has been provided both by the online archives of the aforementioned newspapers and by the Italian libraries in which they have been consulted in paper format. In this introductory section the topic and examples will only be superficially introduced, but the material could form in the future part of a broader research on the reception of contemporary art by the public and by non-specialist press, and the role, influential or not, played by sector reviews.

many other articles were characterized by a sensational style, which was only aimed to attract readers' curiosity through the same approach adopted for other sectors such as television and cinema. Another approach – the most interesting for my research – emerges from those magazines that presented an irreverent and sensational understanding of the art world: this attitude gave importance to the most common stereotypes related to the world of abstract art and its ostensible inexplicability as well as to the new and unusual materials used by new avant-garde currents.[12] The magazines were also often used by critics and artists as direct means for making their harsh criticisms or accusations against other professionals or art exponents who had an opposite opinion. Weekly magazines such as *L'Europeo*, *Le Ore*, and *L'Espresso*, for example, found themselves involved in the early 1960s in the bitter controversy over the legitimacy of the concept of 'arte di gruppo' – which found in Argan a staunch defender – and over the ideological repercussions between art and critical movements that ensued from the Verucchio conference of 1963.[13]

Irreverent and sarcastic judgments on the programmed groups' art production were very frequent in the press of the time. Many elements must be considered carefully: from a disorientation generated by critics and artists' media attacks and their use of the Italian magazines in their favour to the presence – beyond Arte programmata – in the art panorama of the period of numerous art currents and groups to extricate themselves from, as well as a general sense of irony generated by a basic incomprehension of these kinds of avant-garde expressions. Therefore, the attempt to evaluate the relationship of the public with programmed works of art needs to be related with the possible influence of popular media of the time in determining preconceptions, wrong expectations, or loss of interest.

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[12] For a broader overview of the relationship between magazines, the art environment of the 1960s, collecting trends, and the sensationalist approach that the magazines adopted in that period to deal with some art themes and, above all, with the aim to follow the vicissitudes of some famous artists, consult Mariella Milan, 'Rotocalchi, Arte Moderna e "Boom"', in *Boom 60! Era Arte Moderna*, ed. by Mariella Milan and Desdemona Ventroni (Milan: Electa, 2016), pp. 46-69.

[13] Mariella Milan, *Milioni a colori: Rotocalchi e arti visive in Italia 1960-1964*, (Macerata: Quodlibet, 2015), pp. 91-105. On September 26, 1963, the XII Convegno Internazionale di Artisti, Critici e Studiosi d'Arte was inaugurated in Verucchio. The presidency was entrusted to Argan, and the participation of the artists was conspicuous. The conference is divided into three sections: 'Arte e libertà. L'impegno ideologico nelle correnti artistiche contemporanee', reserved for artists and critics; 'Poetica ed estetica nel pensiero contemporaneo. Arte e società contemporanea. L'educazione estetica e i suoi strumenti', addressed by philosophers and sociologists; 'Le più recenti ricerche sperimentali nel campo dell'espressione artistica', with the contributions of psychologists and scientists. At the beginning, Argan tries to outline the rationale and perspectives of the meeting, having the consideration of criticism as a foundation. Among the questions that the critic lets emerge to structure the debate, an important one is about the relationship between the functionality of the artistic work and that of the critical work and whether these two functions take place in two separate cycles or rather in a single moment, hypothesizing a cooperation between artist and critic. In addition, the proceedings of the Conference provide an overview of the various interventions and reveal some of the main and recurring thematic focal points, such as the ideological commitment in contemporary expressions, the social component of art, and the experimentation between art and science. For the Verucchio conference see *Atti del XII Convegno internazionale artisti, critici e studiosi d'arte* (Rimini, Verucchio, San Marino, 1963) and Federica Boragina, 'Il Convegno di Verucchio del 1963 e il dibattito critico nel mondo dell'arte contemporanea', in *Arte Italiana 1960-1964: Identità culturale, confronti internazionali, modelli americani*, ed. by Flavio Fergonzi and Francesco Tedeschi (Milan: Scalpendi editore, 2017), pp. 151-163.

For example, a detail that detects this trend is the impossibility, for many journalists, to determine the real nature of programmed artworks as they could not be qualified as sculptures or paintings. This translates in failure for reporters to define them because they were not characterised by the use of traditional media and they could not be identified by canonical labelling.[14] Amongst the many ways in which the newspapers of the period tried to provide an answer to the question related to the true identity of programmed experiments, a highlight should be put on the attitude of the press to focus only and specifically on the scientific and technical aspect of the product, denouncing a lack of sensitivity and poetry, which were necessary and unavoidable features to identify an object as an artwork.[15]

Illustrated magazines and newspapers took advantage of this general sense of disorientation to guide the reader's attention in the world of contemporary art, exacerbating criticism and considerations with an ironic approach or, to convey, using the words of experts and critics, their controversies and discordant perceptions directly and effectively on a specific movement or art research. Thus, the difficulty for people to understand these provocations[16] emerges also in the lack

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[14] For this reflection see for example Pierluigi Albertoni, 'Arte o non arte? Questo è il problema', *Amicizia*, 6 (1964), 20-23 (p. 23); Mario Camilucci, 'Alla ricerca di una nuova realtà', *L'Osservatore Romano*, 10 June 1961, p. 3; Giorgio Mascherpa, 'Anche il gelato in mostra alla Biennale', *Gente*, 26 (1964), 72, cited in in Mariella Milan, *Milioni a colori: Rotocalchi e arti visive in Italia 1960-1964*, pp. 111-112.

[15] 'Dato dunque che Dio non esiste, che il Rinascimento è morto, che l'arte è morta, e dato che non si può più parlare di pittura, di scultura, di bianco e nero, bisogna – in parole povere – che l'artista non sia più artista e che divenga una specie di artigiano meccanico, di operaio, di tecnico scientifico il quale lavori in società quasi industriale assieme con altri per preparare delle forme utili, forme utili che dovranno quindi coincidere con le forme dell'economia sociale e industriale'. Giuseppe Josca, 'Pochi veri artisti alla Biennale', *Corriere della Sera*, 20 June 1964, p. 3.

[16] The term 'provocation' is justified because the artistic movement that will be discussed throughout the thesis enters the field of research into the sphere of human perceptiveness, which until then had been considered the domain of science, as already mentioned in the first and second sections of this introduction. Later in this dissertation it will be clarified how the artistic movement in question provokes by eradicating the idea of disciplinary boundaries and by pursuing, from both a theoretical and practical point of view, the abolition of interpretation in artistic experience, replacing it with observation and methodical ascertainment. The provocation, therefore, lies in the concept of reinventing the very idea of art from a conceptual point of view. As will be seen below, in fact, programmed artists focussed on the study of a new methodology of contemporary art that rejects the absolutism of the object per se, thus deprived of a research and dissemination purpose. This term, moreover, emerges as the result of a reflection made by me after reading Argan's opinion about the nature of artistic experience and the importance of the production of artistic goods in the essay *Senza margine*. Argan's writing was taken up by critic Lea Vergine in 1983 in the introductory essay on kinetic and programmed art for the catalogue *Arte programmata e cinetica (1953-1963): L'ultima avanguardia*. Argan wrote: 'La contestazione dell'oggetto non ha in sé nulla di teoricamente insostenibile: per fare arte non è assolutamente necessario fare oggetti artistici […]. Se l'arte è il modello del processo che dà luogo all'esperienza estetica, è artistico ogni procedimento che miri a questo scopo e lo consegua. Il sistema tecnologico, considerato come sistema culturale, esclude l'arte a meno che non sia anch'essa una produzione di merce: per conseguenza ogni attività estetica che non si risolve in produzione di merce artistica ha carattere contestativo'. Argan therefore clarifies how a type of art that focuses on the study of the aesthetic process, on the creation of a participatory and active artistic experience, and on the concept of the art object as a physical means of expressing a more complex reflection and research on aesthetic models can be considered disputing and therefore, in my opinion, provocative. Although the essay was written a few years after the end of the collective experience of the Italian programmed artists – a period that represents the real focus of this thesis – the art critic Vergine mentioned it in her introductory essay precisely by focusing on the idea of contestation in describing the controversial relationship of these artists with the idea of the work of art only as a physical object, as well as the limited open-mindedness of the art system that focuses purely on the production of artist's goods. See *Arte programmata e cinetica (1953-1963). L'ultima avanguardia*, ed. by Lea Vergine (Milan: Mazzotta Editore, 1983), pp. 12-16 and Carlo Giulio Argan, 'L'arte come contestazione', *Senza margine*, 1 (1969), 8-11.

of the right linguistic references to at least name the objects displayed in the correct way.[17] Furthermore, meticulous attention to the sounds and noises that this kind of artworks were producing while exhibited often represents a good stratagem for reporters to arouse the readers' indignation and pique, and to deride and parody the technological aspect of the displayed works.[18] The tendency of the media to describe these objects as 'macchinette' or 'giochetti' often derived from the evident inability of reporters to correctly describe programmed art projects and to deal with their dynamism and kinetics. In their reports, for example, the descriptions of displayed objects are superficial and characterized by the use of an inappropriate vocabulary which could only increase people's confusion, limiting and downgrading the innovative scope of the artists' research.[19]

The third influential element to take into consideration when focusing on the observer's viewpoint, is related to the type of recipient programmed artists aimed to engage with their art provocations. Although it was a type of art that, in many circumstances, had been displayed in wide appeal situations or events visited by a large public – such as the Venice Biennale – or in classic locations – such as conventional art galleries – there had been many cases when artists opted for highly sectorial and specialist locations for their exhibitions such as, for example, design stores and showrooms or university museums. This variety may denote an indecisive approach to which kind of public to engage with their experiments, as well as a desire to appeal to both a broader and a more specialist one. Indeed, their works were characterized by innovative and provocative features such as technical programming, small motors, and mechanical elements.

Furthermore, the uncertainty and the difficulties in discerning the observer's role and the complexity of this approach can also be justified by the controversial opinions of critics and experts about the Arte Programmata movement which could potentially have influenced people's judgment towards this type of art expression. Nevertheless, an in-depth study of the role of art critics during the period of the development of programmed experiments would require a separate study and a broader reflection on the role of avant-garde movements in Italy after World War II and their relationship with art criticism. Indeed it was a very turbulent context characterized for example by severe contrasts – as already introduced before – between various critics who supported group art and interdisciplinary experiments and others that were less enthusiastic about them. Besides, the art critics of the period

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[17] This sense of confusion is fictionalized and ridiculed for example by the magazine Epoca which, during the Venice Biennale, published an article entitled 'Noi paghiamo per queste buffonate'. Beyond the particularly controversial title about the latest proposals in contemporary art, it is possible to perceive the difficulty of the journalist to describe programmed artist Davide Boriani's work *Superficie magnetica* which was firstly named 'quadro' and then, with a derogatory tone, 'cosa'. See Raffaele Carrieri, 'Noi paghiamo per queste buffonate', *Epoca*, 718 (1964), 26-29 (p. 26).

[18] Ibid.

[19] See for example Dino Buzzati, 'Lissone cittadella dell'arte astratta. Nati l'altro ieri sono già vecchi', *Corriere dell'Informazione*, 2-3 November 1961.

debated for a long time whether to consider the provocations of the programmed artists as pictorial or sculptural works or whether, instead, a new definition had to be introduced that detached from the more traditional classifications.[20] Therefore, a panorama in turmoil was emerging as well as a certain difficulty in defining this movement which, in some ways, as anticipated before, still persists nowadays, especially with regard to the purpose of the observers and their actual role.

4. Structure of the Thesis

The first chapter of this thesis focuses on four major features that frame the multidisciplinary context in which the Arte Programmata movement developed and outline the definition of a new and emerging idea of work of art. This general framework will be fundamental to later understand the stylistic choices adopted by programmed artists and to better appreciate the innovative relationship between the work of art and the observer that programmed artists set as the primary purpose of their art research. In the first part of the chapter the period under examination will be treated from a social, historical, and cultural point of view; later, some important exhibitions of the same years will be analysed to comprehend the reasons behind new display criteria and to frame the development of a consequent new type of visitor and observer. In the second part of the chapter, particular attention will be paid to the writings of Eco and Gillo Dorfles (1910–2018): with regard to Eco, it will be crucial to summarize the main features of his theory of *open work*, essential for a correct and precise interpretation of the theoretical writings of programmed artists and to better understand their art experimentations. I will focus in particular on the concepts of *openness* and *structure* of the work of art as useful bases to introduce the concept of programming and the particular meaning that Italian artists attributed to it. Another central element that will be introduced in this chapter is the aesthetic and semiotic definition of 'correality' given by Bense: through it I will validate and refine the definition of *open work* given by Eco and I will use it as a theoretical framework to interpret the concept of programming and, thus, propose an innovative analysis that focuses on a purely modal approach. A brief introduction of the concept of cybernetics and Silvio Ceccato's studies will be included in the final part of this first chapter to help accentuating the interdisciplinary approach exploited by programmed artists for their research which finds in the working method of

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[20] Cargen, 'XII Convegno critici artisti studiosi d´arte. La morte dell´arte?', *D´Ars agency*, 5 (1963), pp. 48-9; Gillo Dorfles, 'Visualità tecnologica', *Marcatrè*, 11-12-13 (1965), 109-111.

cyberneticists the right example to combine the rational study on visual perception with that on art objects.

The second chapter aims to deepen the art production of programmed groups T and N during their collective careers, highlighting the evolution undergone by their artworks and, consequently, by the concept of programming. The chapter will explore these aspects not only by carrying out a detailed analysis of a wide variety of selected works, but also through a less utilised approach on this topic, namely the detailed examination of the programmatic texts written for the numerous Miriorama exhibitions of Gruppo T. The words of these artists denote an evident effort to fully understand the significance of an art experience which was both in line with modern times and programmable. The concept of programming in fact evolves with the idea of movement and kinetics and with the definition and evolution of the space-time scope of the art object. The principal national and international exhibitions of the two groups will be examined and, in order to better position this avant-garde movement from a theoretical and art-historical point of view, the chapter will also focus on a comparison with the main manifestos of near-contemporary art movements directly and explicitly related to the development of the Arte Programmata movement. As opposed to the first chapter, where the investigation is addressed in a broader and more general way, the second chapter brings the reader closer to the characterisation of the new modern observer, tracing his/her role within the programmed art experience. At the same time, the investigation on the social role of the modern work of art, introduced in the first chapter, evolves in this one by outlining, thanks to the development of the concept of programming, the idea of an art production that is focused on a didactic and ludic involvement of the observers and is motivated, at the same time, by a desire to investigate their perceptive capabilities.

The third chapter will focus on the avant-garde currents and the previous national and international movements that influenced the stylistic peculiarities of the Italian kinetic movement. There are three main aspects to focus on to complete and integrate the reflection started in Chapter 2. Firstly, from a stylistic point of view, the reference to the past will be fundamental to analyse the influences that brought the use of geometric and elementary modules and structures to transmit the aesthetic information pre-established by the programming activity. Secondly, selected artworks from artists belonging to early twentieth-century avant-garde movements will be considered as essential stimuli for a reflection on the evolution of the art object as a dynamic concept evolving in space and time. Thirdly, the role of the observer as an integral part of the art experience in Arte Programmata will be legitimized as the conclusion of a research and a reflection on kinetics, shapes, space, and time that began at the turn of the century. The work of art acquires a value only if 'executed' by the

observers: programming then has the essential role of guiding this interaction, showing the multifaceted bond between perceptual reactions and the visual stimuli offered.

The final chapter aims to conclude the analysis carried out so far on the concept of programming and on the role of the observer for the Arte Programmata movement. The analysis will be organized in two parts. First, the notion of programming will be completed by clarifying the concept of 'chance' whose dichotomous relationship with the idea of programming will be explained as a necessary counterpart for the functioning and purpose of programming itself. This step will be crucial in acknowledging how chance is indeed the element that facilitates or determines the attention and interaction of the observer, reinforcing the importance of the playful and didactic features of the programming activity. In the second part of the chapter, through the help of Bense's statements on aesthetics and semiotics and through the Eco's theory of *open work*, the idea of programming as a structured form of communication, a set of semiotic information that the observer receives and that are decisive to subsequently interact with the art object itself will be clarified. The contribution of Bensian aesthetic theory will be primary for these reflections: in particular, I will discuss the parallelism between the concept of programming and the notion of 'correality' of a work of art, identified by Bense himself as the mode of being of a work of art. The comparison between these two realities will highlight their similarities, thus coming to define programming as a form of 'correality', an alternative aesthetic reality that determines the artworks' characteristics when it is operative, generating a direct and active dialogue with the observer. The final purpose of this chapter is, then, to identify the inseparable and proven link between the observer and a programmed artwork. From a theoretical point of view, observers are a constituent and essential part of the semiotic structuring of an artwork: from the design phase, a direct interaction with them is the most desired priority of programmed artists.

Chapter 1: The 1960s: an Interdisciplinary Environment

The idea of 'modernity' fully permeates the period between the second half of the 1950s and the end of the 1960s. During these years, Italians witnessed considerable economic and industrial progress that led to important social and cultural transformations. The period was characterized by the development of interdisciplinary studies, such as cybernetics and industrial design, and by the rapid growth of popular media outlets – including television, magazines and periodicals – that favoured a new interest in boundary crossing activities and disciplines.[21]

The purpose of this first chapter is to identify the main novelties of the above-mentioned period in terms of social context, artistic critique and aesthetics. Furthermore, it seeks to explain the importance of the development of new interdisciplinary fields of research in framing the context in which the rise of visual and artistic expressions like Arte Programmata contributed to the definition of a new concept of artwork. The central idea behind this initial, contextual analysis is to examine the new role of artistic content consumers in the 1960s in the elaboration of innovative artistic research. In particular, the chapter focuses on three main areas in order to gain a broader and clearer idea of the impact of this decade.

First of all, the chapter will describe the historical and social circumstances that contributed to stimulate a certain kind of visual research in artistic communities. Secondly, it will investigate the role of critics, philosophers and scientists, whose work is essential to understand the aesthetic novelties of the 1960s, the extent to which they defined the cultural identity of that period, and the changes in cultural taste and needs that marked this period. I will place particular emphasis on the development of cybernetics and on the crucial role of Silvio Ceccato (1914–1997), with regard to his work at the Cybernetics Centre of Milan. Thirdly, it will study in depth the technological and scientific theories that forged the peculiar interdisciplinary studies of those years and that had a

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[21] One cleare example of interdisciplinary interests in 1950s Italy is represented by the periodical *Civiltà delle macchine*, founded by Leonardo Sinisgalli and financed by Finmeccanica. Published between 1953 and 1957, the periodical was defined 'la rivista delle due culture' for its peculiar effort to integrate poetry, art, literature, economics, sciences, cybernetics, philosophy, history, industrial design and technology into its pages. For this reason, Dorfles – in the introduction of the *Civiltà delle macchine. Antologia di una rivista 1953-1957* – wrote: 'Certamente l'epoca era propizia a un simile "interplay". […] il mito d'una civiltà basata sulla tecnologia più avanzata era ancora molto potente; e, d'altro canto, la convinzione di Sinisgalli che anche il poeta e l'artista potessero accostarsi all'universo scientifico […] facevano sì che il terreno in cui i testi della rivista potevano addentrarsi fosse molto vasto e fertile e permettesse tanto le disquisizioni altamente scientifiche (sia pure a un livello divulgativo), quanto la presenza di testi decisamente letterari o di critica dell'arte e dell'architettura.' *Civiltà delle macchine. Antologia di una rivista 1953-1957*, ed. by Vanni Scheiwiller (Milan: Libri Scheiwiller, 1988), p. X-XI.

profound impact on the development of artistic theories regarding the relationship between programming and human behaviour.

The first part of the chapter will offer a historical and contextual analysis of Italy between the 1950s and 1960s. This section will also trace the evolution of a new, emerging way of communicating cultural content that combined a didactic approach with a ludic one. I will examine some important cultural events of the period to confirm this affirmation. In fact, innovative exhibition choices reflected the needs of the modern observer and communicated new approaches to knowledge. The general influence of Italian scientific progress, the undeniable democratization and popularization of culture, the development of new aesthetic theories, and the investigation of the observer's active presence in artistic experiences are at the basis of the definition of a new concept of art. The principal features of this new work of art – as I will explain below – were its rationality and modular structure, as well as its adaptability to any kind of observer. To better explain these concepts and describe some of the most influential critics and philosophers who have worked on this topic, in the following sections I will present several key theories that were developed at the time by Eco, Dorfles, Abraham A. Moles (1920–1992) and Bense. A brief description on one of the most influential fields of research of the period, cybernetics, will be added to better contextualize the interdisciplinary environment where these ideas were conceptualized.

Finally, in this chapter I will also analyse the role of education and the importance of people's awareness of their relationship with art for artists and critics. The clarification of these features will allow me to elaborate – in the following chapters – the real exchange between audiences and Arte Programmata artworks.

1.1 Society and Culture during the Economic Boom

1.1.1 Society and Culture in the 1960s: Contradictions and Dichotomies

The period between the end of the 1950s and 1968 – a year characterized by student protests and, in general, social tensions – was undoubtedly one of the most fundamental phases in recent Italian history. The following key terms can define this important moment: cultural contradiction, social disparity, the growing influence of mass media, the democratization of information, a contrast between the individual and the community, the popularization of culture, rapid economic development, and a growing relationship between education and entertainment. During this decade, Italy suddenly experienced a major technological development, and scientific research substantially

improved. In general, this period symbolized the rebirth of Italy after the dramatic events of the Second World War, at a time when both science and technology played a critical role in the development of new aesthetic theories. Fausto Curi – a member of the Italian literary avant-garde movement Gruppo 63 – clarified this in an article published in the influential journal *il Verri*, in the monthly feature titled 'Diario Minimo' (edited by Eco between 1959 and 1961):

> Quel che è certo è che parole come *sperimentare*, *sperimentalismo*, riguardano tutti, e giovano a tutti. Illuminano, dall'interno, e in ciascuno di noi, non diremo la totalità della condizione di ciascuno e del lavoro che ciascuno compie, fino a esaurirne completamente il senso, bensì un aspetto di essi che è utile tener sempre presente.[22]

This particular need for an increasingly scientific approach in the management of the country's economic, political and moral spheres clearly emerges from the works of one of the most famous and enlightened industrialists in Italian history, Adriano Olivetti (1901–1960), an indisputable protagonist of the technological evolution of those years.[23] In the essay 'Le forze spirituali' (1960), despite his Catholic belief and a religious imprint on his life, he advances the utopian idea that a new modern and honest society is made possible by the freedom that only scientific improvement can provide:

> Si potrà pensare che tutto ciò non sia di ordine pratico; mi sforzerò di dimostrare in quale maniera noi potremmo essere guidati in uno sforzo comune nel nostro paese. Ho parlato di Verità per prima. Verità in una società umana significa cultura libera, indipendenza di ricerche e conoscenze scientifiche.[24]

Olivetti's idea can be explained as a compromise not only between socialism and capitalism, but also between scientific accuracy and Catholic morality. Furthermore, it underlines the fact that modern industrialization was becoming a fundamental element for the nation's progress and well-being, thus defining 'a new civilization'. In his words, the technological improvement of this epoch acquired the meaning of a rebirth, a new era where science and morality could coexist.

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[22] Fausto Curi, 'Dello sperimentare', *il Verri*, 3, (1959), 46.
[23] The production of Olivetti typewriters grew exponentially during those years, rising from 151,000 units in 1957 to 652,000 in 1961. Paul Ginsborg, *Storia d'Italia dal dopoguerra a oggi* (Turin: Einaudi Editore, 1989), p. 291.
[24] Adriano Olivetti, *Città dell'uomo*, ed. by Alberto Saibene, 2nd edn (Rome/Ivrea: Comunità editrice, 2015), e-book (chapter 1, location 56-57).

> Nessuno rinuncerebbe alla nuova civiltà, a quest'epoca del cemento armato, dei motori, degli antibiotici, della radio e della televisione. Nessuno tornerebbe indietro, non dico di secoli, ma nemmeno di cinquant'anni.[25]

This new sense of prosperity, which characterized the period of the so-called 'Economic Boom' (1958–1963), is in contrast with what some of the intellectuals of the epoch said: they openly denounced a general cultural flattening that was caused, as Eco wrote in his book *Apocalittici e integrati*, by the unstoppable expansion of mass media (see Chapter 1, section 1.2).[26] The idea of freedom and democracy as promoted by science, the recourse to experimentation for public purposes and the drive for a more conscious involvement in cultural experiences are essential concepts if we want to not only frame an epoch, but also investigate the bases of the artistic research conducted by Arte Programmata artists.

In his analysis of the post-war situation in Italy, *Storia d'Italia dal dopoguerra a oggi*, Paul Ginsborg (1945) introduces his chapter on the economic miracle by stressing that Italy was no longer considered a farming country and began to be seen as one of the most industrialized countries in Europe.[27] Modern appliances became the symbol of this new era of regeneration: fridges, televisions, washing machines and typing machines started to enter Italian homes and to embody a new model of economic wealth.

This historical period was marred by contradictions and social tensions that also affected the cultural sphere. Wage struggles and social disparities, exacerbated by an urban environment that lacked adequate social services, are just some of the problems faced by the working class of the period. Furthermore, the enormous demand for new Italian products negatively impacted on workers, forcing them to stand at the assembly line for hours and with only a few breaks during the long working day. After 1962, union unrest occurred ever more frequently, starting in Turin, where the riots of Piazza Statuto revealed the hidden subversive desire of the frustrated working classes.[28] The overall economic wealth and growing consumerism – brought on by the purchase of modern appliances and new technological devices – had a counter side, though: the absence of adequate public

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[25] Ibid., (chapter 1, location 63-64).
[26] This idea of the light of new progress is quite common in this period. Previously, Curi hinted at the idea that 'sperimentalismo' must enlighten everyone, whereas Olivetti made a clear comparison between the concept of 'Verità' and scientific knowledge. Eco, instead, uses the term 'Illuminismo' in a negative way: in the introduction of the book *L'industria della cultura*, the theorist disapproves of the general tendency of American critics in the 1950s to consider mass culture a very positive phenomenon, stating that 'I testi proposti in questo volume […] sono degli excerta, tra i più significativi, della polemica svoltasi in America negli anni Cinquanta […] L'inadeguatezza era quella di una posizione sostanzialmente illuministica. Pervade molti di questi saggi una fiducia aristocratica e sincera nel potere della cultura'. Dwight Macdonald and others, *L'industria della cultura* (Milan: Bompiani, 1969), p. XI.
[27] Ginsborg, p. 286.
[28] Ginsborg, p. 343.

services such as hospitals, schools and transport. The 'economic boom' was characterized, then, by this jarring dichotomy: all technological efforts were focused on individual and domestic wealth, completely ignoring the real, public necessities.[29] This implies that great attention was paid to the quality of the time spent within the family unit, to the detriment of collective needs.[30] Ginsborg describes people's daily life in those years as passive and domestic,[31] stressing that, by the second half of the 1950s, leisure time was spent mainly in a private way, preferably at home and in front of the television. A growing number of people chose to watch variety and quiz shows, sporting events or the legendary Carosello, rather than participate in more associative activities.[32] John Foot, defining Milan as the capital of design and the centre of the creative industrial revolution of the 1960s, states that the diffusion of TV sets happened much faster there in comparison with other Italian cities. Television shows were able to democratize the concept of leisure time, offering a new kind of entertainment that was available, shareable and appreciated by every member of society. Television, as the new main means of recreation, became a real need for the common citizen, and its purchase was therefore a priority.[33]

By the 1960s, the new citizen had new habits; people had learned how to manage their time with the help of machines, and they started to spend their daytime hours using new technological devices both in and out of the house. In this way, they radically changed their way of thinking and their approach to time management. People gradually adapted to the consumption of technology and absorbed a different kind of aesthetics. As stated by Dorfles, in the 1960s people got used to a new, rapid, dynamic and constantly moving rhythm of life, comparable to the traffic of modern cities. This tendency inevitably led people to perceive the surrounding environment differently, thus experiencing a new concept of time relativity. As a consequence, the inhabitants of the cities became accustomed to velocity and to a new industrial aesthetics, all the while being aware of the presence of an alternative – yet completely imaginary – temporality, which was produced by movies as well as by television content.[34] The concepts of alternative temporality and velocity can be linked to two other,

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[29] Ibid. p. 291.
[30] Ibid., p. 292.
[31] Ibid., p. 328.
[32] According to Ginsborg, in 1954, when television started broadcasting, there were only 88,000 subscriptions, whereas in 1965 49% of Italian people owned a television. Ibid., p. 326.
[33] John Foot, *Milano dopo il miracolo: Biografia di una città*, 2nd edn (Milan: Feltrinelli Editore, 2015), pp. 13, 43-44.
[34] 'Le trasformazioni subite in seguito alla velocità dal mondo esterno entro il quale siamo immessi sono esse pure di due tipi: da un lato abbiamo nuove possibilità di visualizzazione indotte dalla velocità (visione dal treno in corsa, dall'aereo ecc.), dall'altro abbiamo gli effetti che il movimento esercita sulla struttura degli oggetti artificialmente prodotti che sono modificati 'per far fronte' al movimento stesso (forme areodinamiche ecc.)'. Gillo Dorfles, 'Nuovi riti, nuovi miti [1965]', in *Estetica senza dialettica: Scritti dal 1933 al 2014*, ed. by Luca Cesari (Milan: Bompiani, 2016), pp. 1043-1287 (pp. 1153-1154).
'Lo spettatore cinematografico (televisivo) si avvezza così a un diverso modo di registrazione delle sequenze cinetiche, non soltanto per il fatto del loro essere "figure in movimento", ma soprattutto per il fatto del loro svolgersi in un tempo –

interconnected keywords that are fundamental in a general overview of this historical period: 'metamorphosis' and 'context'. The idea of metamorphosis typified the urban context where people lived, whereas the new technological context allowed for the development of the multisensory stimuli that surrounded people. This sensorial instability was provoked by the metamorphic and effervescent context of the city, which constantly evolved under people's eyes; it must be analysed along with the new innovative communication device – the TV set – that completely modified the way in which people received information, because it started to simultaneously stimulate their senses. The citizens of the 1960s were therefore spurred to modify and stimulate their senses inside and outside the house: outside, by urban life; inside, by the device that filled the vast majority of their leisure time. Television users, then, changed their perceptual system, starting to use more senses together and in an innovative way. This consideration is summarized by Foot's analysis of the exponential increase of television ownership among Italian families during the economic boom: '[…] La televisione andava guardata. Questo nuovo mezzo di comunicazione basato sull'immagine esercitava un potere particolare e richiedeva una forma di attenzione diversa rispetto alla radio'.[35]

Mario Morcellini and Paolo De Nardis, in *Società e industria culturale in Italia*, highlight how the need for widely accessible cultural content increased exponentially in those years, with the media becoming increasingly integrated with different genres, thus preparing the birth of multimedia cultural products.[36] The new, heterogeneous TV programmes had multiple purposes: in some cases, they were informative and recreational, but also educational. A good example is the broadcasting of the programme 'Non è mai troppo tardi,' which ran from 1960 to 1968 and contributed to improve the country's literacy rate.[37]

Sounds and images became the basis of a new informative and recreational system, characterized by an omnipresent aesthetics that was dominated by technology. For instance, the urban landscape changed radically, not only as a result of the growing presence of cars and public transport vehicles

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o meglio in una durata – che non è assolutamente più quella della vita reale, che può essere più rallentata, più accelerata, del tutto immaginaria'. Ibid., pp. 1156.

[35] Foot, p. 106.

[36] 'In generale, però, il fenomeno che si va delineando è l'esplosione di bisogni culturali e comunicativi sempre più articolati, in un quadro in cui – dal punto di vista del consumo – sembra imporsi più la logica dell'integrazione tra *media* e generi di spettacolo, che l'antagonismo competitivo del recente passato. Del resto anche dal punto di vista dell'offerta le logiche oggi predominati sul mercato si indirizzano sempre più verso prodotti culturali a declinazione multimediale'. *Società e industria culturale in Italia*, ed. by Mario Morcellini and Paolo De Nardis (Rome: Meltemi editore, 1999), p. 29.

[37] The programme was conducted by the educator Alberto Manzi, with the aim of teaching Italians who were still (completely or partially) illiterate how to read and write. These were authentic classroom lessons on live television, during which Manzi used modern teaching techniques consisting of films, audio supports, practical demonstrations, as well as sketches drawn on a large black sheet. It is estimated that almost one and a half million people obtained their primary school leaving certificate thanks to these distance lessons, which were actually designed on the basis of a real evening course. See https://www.teche.rai.it/2015/03/il-maestro-manzi-a-vele-spiegate/ [accessed 3 September 2021] and Aldo Grasso, *Storia della televisione italiana*, (Milan: Garzanti, 2000), pp. 93–94.

on the streets (fig. 1), but also because of the new modern appliances that filled the shop windows. In his description of the new urban panorama, characterized by forests of antennas, Foot underlines the important role of shop windows as follows:

> Nelle aree urbane cominciarono a sorgere anche negozi di televisori, con gli apparecchi accesi esposti nelle vetrine. I passanti si fermavano a guardare certi programmi (senza audio) attraverso la vetrina, e spesso, a specifici orari, si formava un crocchio di persone.[38]

1.1.2 Exhibitions in the 1960s as Symbols of a New Epoch and of the Innovative Function of Art

The new concept of leisure time, in this period dominated and shaped by mass media, was the focus of research by intellectuals and critics called to organize the 'XIII Triennale', which took place in Milan in 1964 – an exhibition that had many similarities with Arte Programmata in terms of exhibiting and aesthetic choices, philosophical inspirations and its relationship with the public. The architect and essayist Vittorio Gregotti (1927–2020), who was responsible – along with Eco – for the organization of the International Introductory Section, described the purpose and the message that the event aimed to communicate in *il Verri* magazine:

> Il metodo seguito è stato quello di porre continuamente il visitatore di fronte ad una serie di rappresentazioni tradizionali del tempo libero per opporgli immediatamente, volta a volta, l'altro aspetto della questione, per spiegargli cioè come egli si fosse abituato a una sorta di stereotipo.[39]

The aim of the exhibition was to develop the observers' critical judgement, forcing them to face the miserable reality of their life – that is, the modern human being's subjugation to the powerful means of mass culture – by using that same means in the exhibition itinerary. This edition of the Triennale can be distinguished from others for its being a denunciation and a protest event, strictly linked to the problems of Italian society in the 1960s. The show was considered an 'experiment', completely different from the Triennale's previous, canonical editions, where there had been a simpler focus on

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[38] Foot, p. 111.

[39] Vittorio Gregotti, 'Un'esperienza alla XIII Triennale', *il Verri*, 14 (1964), 101-110 (p. 101).
Eco expresses similar concepts in the essay 'You must remember this…', published in the catalogue of the exhibition titled *The Italian metamorphosis 1943-1968*, organized by the famous Italian curator Germano Celant (1940–2020) in 1994 at the Guggenheim Museum: 'One wondered whether that nascent *société du spectacle* would inspire a freer way of life, reach in original experiences, or create a new kind of conformism. For the 1964 *Triennale* the decision was made to debate this question not in written essays but rather in a spectacle that today would be called multimedia, laid out in such a way as to allow multiple choices, anticipating, in a real format, what now would be called a hypertext, a virtual labyrinth'. Umberto Eco, 'You must remember this…', in *Italian metamorphosis 1943-1968*, ed. by Germano Celant (Milan: Arnaldo Mondadori Editore, 1994), pp xii-xv (p. xiv).

themes such as architecture and city planning.[40] The principal themes that were debated during the event were the aggregation and optimization of leisure time. More generally, the aim of this edition of the Triennale was to study how much leisure time people generally had as opposed to working time, as well as to examine the quality of the actual recreational time itself.[41]

To contextualize these topics and get a clearer idea of the cultural background of these years, it is useful to analyse the opening speech given by the Minister for Scientific Research, Carlo Arnaudi, on 12 June 1964. Arnaudi focused on the increasingly evident relation between an inadequate management of free time, where the cultural product is imposed through propaganda, and the level of industrialization and scientific progress of Italian society. According to Arnaudi, the absolute loyalty of the consumer and the propagandistic contents of mass culture did not facilitate the growth of brilliant minds. Furthermore, the dependence on mass media inhibited the desire for emancipation and progress that is the fundamental driving force of a modern and developed country.[42] It is clear, then, that intellectuals and critics attributed a social responsibility to the new popular culture, which they considered the first cause of the moral and scientific decline of a nation.[43]

Eco shared this strong condemnation of the misleading power of modern leisure time; in the notes for the preparation of the event, Eco highlighted that the total and blind escape facilitated by mass media contents such as television shows, comedy movies and popular songs could be dangerous for society.[44] In his opinion, the common idea of leisure time that was unfolding did not produce relaxation: rather, it was an exhausting activity. In addition, this kind of tiredness resulted in an alarming 'numbness' of people's minds. Eco's idea of leisure time clashes with that one offered by modern mass media; for Eco, leisure time was characterized by dynamic activities and encouraged people's ability to think critically.[45] As we will see below, Eco's theory of a didactic spare time characterized by dynamism and critical thinking came close to some of the intentions the Arte

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[40] As I have previously mentioned, the general idea behind this period is the incessant and constant reference to a scientific vision. This experimental attitude is surely influenced and motivated by the development of mass media technologies but, in some ways, it puts itself against these popular innovations. This link between experimentation and mass media is well expressed by Gregotti: 'D'altro canto poiché una struttura come quella della Triennale non ha sino ad ora né i mezzi né il compito di elaborazione a livello teorico, ma solo quello di comunicazione di massa o di occasione di sperimentazione, ci si pone immediatamente il problema dei limiti di efficacia di comunicazione, di una mostra visitata da 300,000 persone nei confronti, per esempio, di un mezzo come la televisione o il cinema. Resta, appunto, l'occasione sperimentale. Ma quale sperimentazione, ci si deve domandare? Quella concernente il tema o quella concernente il linguaggio dell'architettura?' Vittorio Gregotti, pp. 101-110 (109).

[41] *Tredicesima Triennale di Milano: Esposizione internazionale delle arti decorative e industriali moderne e dell'architettura moderna* (Milan: Triennale di Milano, 1964), p. 10.

[42] Ibid., p. 9.

[43] 'Ma è vero che i problemi del tempo libero non si limitano solo a questo e sono più complessi e più gravi, in un certo senso si identificano con i problemi dello sviluppo industriale. […] Una migliore utilizzazione del tempo libero vuol dire cittadini più colti, più preparati alle funzioni che la democrazia ad essi attribuisce e quindi anche più capaci di capire che forti investimenti nella ricerca scientifica significano elevare il tono tecnico ed industriale della nazione'. Ibid.

[44] *Tempo libero, tempo di vita: Note, studi, disegni sulla preparazione della 13 Triennale a cura della giunta esecutiva*, ed. by Agenore Fabbri and others (Bergamo: Giordano Editore, 1964), p. 41.

[45] Ibid.

Programmata artists attributed to art, namely active participation and didactic value. More generally, Eco promoted the idea of associative spare time, although he considered it a time in which discussions and the exchange of ideas aimed at the emancipation of the individual prevailed.

It is evident that, in these years, the massification of cultural means brought along a general desire for engagement in recreational activities; technological progress had made this new popular need increasingly multisensory and multimedia (relating to the radio, television, cinemas and urban multi-stimuli environments). The role of artists and intellectuals therefore acquired a new purpose: to question and criticise the standardization of leisure time in the observer's mind.[46] At this stage, the renewal of the artist's social function in order to educate people about the correct use of their own recreational time became necessary. Gregotti and Eco had this purpose in mind when they organized the first section of the Triennale. This mission could be considered a symbolic 'rip of Maya's veil', that is, the necessity to reveal the inconsistent nature of mass media products to their audiences. Furthermore, the idea of educating people through a new type of cultural experience would be highly valued by programmed artists who, in the same period, considered the pure forms of their artworks as the correct way to stimulate and educate observers through a new concept of art, one shareable and enjoyable by everyone equally.

This didactic intention clearly emerges in the first room of the Introductory Section, where various, typical recreational activities were represented. The environment was characterized by a very engaging style that attempted to symbolize the illusory power of mass media (fig. 2). The exhibition catalogue describes the room with these words:

> Entrando il visitatore si trova immerso in un ambiente multicolore e opalescente ('il terminal dell'esaltazione'), dove dalle pareti una serie modulare di immagini luminose, a intermittenza, accompagnate da un nastro sonoro su cui sono incisi e sovrapposti inviti a godere del proprio tempo libero […], gli propone tutte le possibilità che oggi l'industria del tempo libero mette a disposizione del cittadino. Poiché il materiale grafico e figurativo è tratto da reali inserzioni pubblicitarie, questa sorta di 'paradiso' dell'evasione ha tutta

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[46] According to Eco (under the pseudonym of Dedalus for the column 'Diario minimo' of *il Verri* magazine), it was time for artists to find their position in society, contributing to its progress: 'Il contrasto tra artista e società è ormai un *topos* perfino consunto. Comunque si tratta di un contrasto che siamo sempre pronti a scusare con molta indulgenza perché il genio ha diritto alla sregolatezza e la sregolatezza all'incomprensione da parte dei filistei. Ma grazie a Dio oggigiorno lo iato dovrebbe essere in via di superamento, e l'arte sta per integrarsi alla vita quotidiana alle funzioni comuni, ai rapporti sociali concreti. Quando l'artista si pone su questa strada non ha più diritto ai fasti dell'incomprensione. Guai'. Dedalus, 'Uso e bellezza', *il Verri*, 4 (1959), 140.

l'apparenza della raggiungibilità e della concretezza e richiede al visitatore un atto di fiduciosa euforia.[47]

These lines contain some important sentences that perfectly characterize the aesthetic revolution of those years. Terms such as 'ambiente multicolore', 'serie di immagini luminose a intermittenza' and 'nastro sonoro' reflect the artists' need to apply contemporary communicative methods to their works in order to stimulate the observer's participation. To describe the vain illusion of freedom, artists were forced to use the same 'weapons' as those used by mass media, generating happiness and ecstasy in the observer's mind.

To some degree, the second room can be defined in a similar way as the first. While Eco defined the space in the catalogue's pages as a 'camera di decompressione' and as 'squallida e vuota', so as to indicate the real emptiness left behind by mass cultural activities, what the room really expressed was the concept of the observer's engagement.[48] Thus, the visitor had to personally interact with one of the five machines positioned in the room (fig. 3) by inserting personal data. Based on the information given by the visitors, the machine recommended one of four possible itineraries for the subsequent space. Although Eco and Gregotti underlined the fact that the machine's suggested choices were completely random, exaggerating the concept of people's ephemeral freedom in the choice of leisure activities, the organizers once again opted for the typical expressive language of mass media to communicate this message. In this particular case, the machines recall the concept behind jukeboxes – or electrical appliances in general – as well as those game shows where competitors use machines and buttons to select the right answer. What is important to underline is the direct and physical interaction between the visitors and the machines, a new routine that people acquired in the 1960s as they became familiar with this kind of technological interactions in their homes and daily routines.

The third room, defined by Eco as 'illusiva' and 'labirintica' because of the presence of staircases, mirrors and silver reflective material that covered the walls entirely, included the four paths mentioned above.[49] Each of them ('Tecnica', 'Illusioni', 'Utopie' and 'Integrazione') represented the precariousness of modern spare time. The environment was captivating and extremely stimulating from a sensorial point of view, leaving the visitor completely disoriented and confused.[50]

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[47] *Tredicesima Triennale di Milano*: *Esposizione internazionale delle arti decorative e industriali moderne e dell'architettura moderna*, p. 14.

[48] Ibid.

[49] Ibid.

[50] 'Nell'ambiente totalmente rivestito in metallica carta d'argento, i visitatori salgono e scendono, in realtà e in immagine, lungo le fughe di scale che il soffitto riproduce capovolte e gli specchi ripetono e moltiplicano: fino a perdere il senso del luogo geometrico e del rapporto dimensionale. Disorientamento. Astrazione dal presente per isolare il concetto di "tempo libero" dalle associazioni abituali'. 'Prime immagini della tredicesima Triennale', *Domus*, 417 (1964), 1-10 (p. 3). The

We could argue that this environment was a form of entertainment itself, because it could exist even without the moral and didactic meaning imposed by the organizers. What clearly emerged in this context was a new idea of an entertaining environment that derived from the observers' crucial need for sensorial stimuli; thanks to their everyday, urban multi-stimuli context, the new type of visitors could no longer renounce these kinds of stimuli.

Perhaps the most iconic structure of this section – and indeed of the entire exposition – was the 'caleidoscopio', which undoubtedly offered an astonishing and spectacular experience (fig. 4). The visitor will have been puzzled and influenced by the prismatic shape of the space, the presence of mirrors on both the floor and the ceiling, and film projections on the floors that were inexorably also projected onto the six walls of the 'caleidoscopio'. Eco apty described the immersive power of the installation when he specified that '[…] lo spettatore è partecipante e fisicamente coinvolto nello spettacolo'.[51] The ultimate purpose was to disorient the visitor, who should leave the section 'deformato e impotente', finally aware of the negative nature of such recreational activities.[52] The experience inside the 'caleidoscopio' – full of different sensorial stimuli and, for this reason, highly entertaining for the 1960s visitor – had a double purpose: to entertain but also convey a deeper meaning. *Domus* magazine referred to the space with the words 'Gioco contemporaneo di immagini e di idee'.[53] This definition seems most suitable to describe both the work's twofold aim and its double nature: recreational and educational.

Hence, this edition of the Triennale played with the concept of 'negazione', where the instilled message rejected and overturned the initial instinctive idea that was induced by the interaction with the work, environment, or device.[54] Dorfles ideally summarized the meaning of this event in the essay *Il consumo delle immagini e la comunicazione artistica* (1965). In general, he admitted that a complete change had affected modern society, where it was now impossible to avoid a predominant industrial aesthetics:

Cosa riesce infatti a cementare gli individui dell'attuale cultura di massa se non la radio, la televisione, il cinema, la grafica pubblicitaria, gli oggetti prodotti in serie dall'industria? Sono

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'Utopie' environment was conceived by Fontana in collaboration with the artist Nanda Vigo (1936–2020). The environment was featured with walls and ceiling covered with red wallpaper with a metallic effect while at the two ends of the short side of the room were moulded glass plates that filtered the red light produced by neon tubes. For a detailed and technical description of the work see *Lucio Fontana: Ambienti/Environments*, ed. by Marisa Pugliese, Barbara Ferriani, Vicente Todolì (Milan: Mousse Publishing, 2017), pp. 178-180.

[51] *Tredicesima Triennale di Milano*: *Esposizione internazionale delle arti decorative e industriali moderne e dell'architettura moderna*, p. 15.

[52] Ibid.

[53] 'Prime immagini della tredicesima Triennale', pp. 1-10 (p. 6).

[54] 'Questo è il linguaggio della Triennale nella sua parte introduttiva e teorica, costruita come discorso critico sul concetto di tempo libero, illuminato 'per negazione' dai limiti che, ieri e oggi, lo condizionano'. 'Prime immagini della tredicesima Triennale', pp. 1-10 (p. 2).

dunque tali *mass media* […] a tenere costantemente 'informati' gli uomini di ogni livello sociale, ed è proprio l'informazione proveniente da questi 'canali' sonori, visuali e – aggiungerei – 'tattili' (il maneggiare costantemente i gadget domestici, gli strumenti prodotti in serie per l'uso quotidiano) che consente una rapida comunicazione tra gli individui; e tale comunicazione – si badi bene – è quasi sempre accompagnata e intessuta da un elemento estetico. [55]

Dorfles appears resigned and, at the same time, confident that the evolution of the power of mass media is inexorable and deeply rooted at every social level. The reference to the tactile consumption of an object, with the resulting exchange of information, is extremely interesting: this image represents people's new daily habits and can be linked to the aforementioned 'educational game' that Eco and Gregotti organized in the second room of the Introductory Section (fig. 3). Furthermore, it anticipates a concept that I will develop further on: the tactile relationship between Arte Programmata artworks and observers, their emotional reaction, and the definition of a new concept of art. We could argue that, throughout the experience, the observer's attention was focused more on the enthusiastic manual interaction with machines, the delivery of a customized suggestion for exploring the exhibition, and the possibility of sharing this novelty with other people, than on an immediate social and ethical reflection on the quality of leisure time.

The key events of this decade were characterized by a social interpretation of art and its use for experiments in educational entertainment. This tendency was particularly evident, for example, in the 'Esposizione Internazionale del Lavoro', organized in Turin in 1961 to celebrate one hundred years of technical and social development in Italy. In fact, in the notes of the *Criteri per la realizzazione del Settore Italiano dell'Esposizione Internazionale del lavoro*, the necessity to create content that was suitable for popular consumption is emphasised.[56] The exposition focused on the incredible technological progress of those years; although the focus was on Italy's technological novelties, other countries were invited to display their innovations too. Thus, in the Italian section, an entire space was dedicated to raw materials: the room was characterized by a captivating atmosphere where mirrored walls endlessly reproduced the selected images (fig. 5). The environment aimed to recreate, in the observer's mind, the image of a magical world that reminded visitors of the

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[55] Gillo Dorfles, 'Il consumo delle immagini e la comunicazione artistica [1965]', in *Estetica senza dialettica: scritti dal 1933 al 2014*, ed. by Luca Cesari, pp. 1288-1295 (p. 1290), (first publ. in *Humana*, 5-6 (1965), 230-237).

[56] 'Il Comitato Ordinatore sottolinea infine il fatto che questa idea comune – l'uomo – si presta efficacemente come nessun'altra a costruire il filo di un discorso che ha lo scopo precipuo di rivolgersi contemporaneamente all'intelletto e alla sensibilità della gente comune, permettendo a ciascun visitatore di capire con immediatezza di essere esso stesso il vero protagonista, creatore e beneficiario del progresso illustrato nell'Esposizione'. *Esposizione internazionale del lavoro. Criteri per la realizzazione del settore italiano dell'esposizione internazionale del lavoro. Celebrazione del centenario dell'Unità d'Italia Torino, maggio-ottobre 1961*, (Turin: Italia 61, 1961), p. 5.

real spaces where these raw materials were mined, or the laboratories where they were created.[57] The section dedicated to energy sources – portrayed in the same style – was extremely interesting; the space was filled with a ten-metre high wire fence of neon lights created by Lucio Fontana (1899–1968).[58] The *environment* consisted of a luminous structure constructed using blue and green neon tubes that were hung and arranged on seven different levels following convergent and divergent transvers lines inside an octagonal-shaped room whose walls were covered with a reflecting metal foil. Although this luminous interweaving appeared geometrical and linear, the space filled with light seemed amplified and the distinction between volume and surface vanished. Four neon lights positioned at the entrance to the room acted as a luminous threshold, inviting visitors to walk through the *environment*. The artwork led visitors to direct their gazes upwards and contemplate the almost-blinding effect of light in the surrounding space.[59] The installation expressed the country's general electrification in a spatial, emotional, engaging and captivating way (fig. 6 and 7).

Nevertheless, the work that best summarized the boundary crossing atmosphere of the major exhibitions of this period and that embodied concepts such as 'edutainment',[60] technological development, science, progress and interdisciplinarity, was what *Domus* magazine called a 'macchina simbolica'. It was located in the United States section, dedicated to the theme of technological development in industry (fig. 8):

Nella sezione degli Stati Uniti (Harley Earl Associates) i temi sono 'lo sviluppo tecnologico nell'industria' e 'l'uomo e le telecomunicazioni'. Una singolare 'macchina simbolica' esposta è questo gigantesco cervello in cui il gioco di trentamila lampadine di due colori illustra schematicamente il processo di adattamento dell'occhio e dell'orecchio umani alle immagini e ai suoni (studenti italiani della facoltà di Fisica Nucleare di Torino spiegano 'il cervello' ai visitatori).[61]

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[57] 'Italia '61 a Torino: immagini della Esposizione del Lavoro. Immagini della Mostra delle Regioni', *Domus*, 381 (1961), 1-19 (pp. 8-9).

[58] 'E.I.L.: momenti di uno spettacolo, prima dell'apertura', *Domus*, 380 (1961) 1-18 (p. 12).

[59] For a detailed and technical description of this work see *Lucio Fontana: Ambienti/Environments*, ed. by Marisa Pugliese, Barbara Ferriani, Vicente Todolì, pp.172-174.

[60] The neologism 'edutainment', crasis of 'educate' and 'entertainment', was officially used for the first time in 1973, by Robert Heyman, during the production of some documentaries for the National Geographic Society. The term refers to the medium's potential to educate and, at the same time, entertain. The Triennale edition of 1964 and the 'Esposizione Internazionale del Lavoro' of 1961 can be considered two examples of edutainment, where people had the opportunity to enjoy didactic contents in an entertaining way. Even though the neologism was created in the 1970s, in this thesis I will use it to refer to 1960s artistic expressions and movements, such as Arte Programmata.

[61] 'Italia '61 a Torino: immagini della Esposizione del Lavoro. Immagini della Mostra delle Regioni', pp. 1-19 (11).

More precisely, the electrical model of a human brain demonstrated how a person receives an image or sound and then transmits, judges, reacts to and stores it in their memory.[62] The graphic designer Will Burtin (1908–1972) designed the machine for the pharmaceutical manufacturing company Upjohn. The work reflects the unique historical moment of the 1960s, emphasising the increasing interest in cognitive sciences and, most of all, testifying to a growing concern with multisensory stimuli in people's minds as a consequence of the dissemination of new means of mass communication.

Following the tendency of this period towards the employment of exhibition systems focused on a new definition of art and on the importance of cultural communication, the art critic Pierre Restany (1930–2003) seemed to observe the same features at the 'XXXII Biennale' in Venice (1964), the first Biennale to display programmed artworks. Restany dedicated an article to the Venetian event in *Domus* magazine, highlighting the Biennale's new interest in contemporaneity; the exhibition was no longer a mere celebration of the past or a glorification of an already consolidated type of art, but 'una "tribuna di informazione sull'arte di oggi"'.[63] According to Restany, more than a simple exhibition the new Biennale was a sociological phenomenon that took its cue from the rush of urban life:

Questa Biennale […] ha contrapposto un linguaggio fondato sulla tecnologia, sul *reportage*, sull'appropriazione diretta degli elementi del folklore urbano e dell'oggetto di serie. La natura oggi non è un fatto morale e politico […], ma un tutto che s'impone di per sé, un fatto sociologico ricco di mille intrinseche virtualità espressive.[64]

It is possible to trace some of the critical elements that I have identified above in Restany's words. The influence of technology and the social relationship with the visitor can be linked to the general tendency of this period to reconsider the artwork in a more rational and educational way. In Restany's opinion, this new orientation inevitably brings about that re-evaluation of the concept of the 'museum', which has to follow new objectives in line with the new social context and the stakeholder's needs. The idea of the museum as the place for a historical consecration of art was already outdated, and a new idea of museology had to emerge: 'Questo atteggiamento è, in realtà, il più generale: il museo è un laboratorio sperimentale dell'arte vivente, un centro di informazione e di

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[62]Source: https://designobserver.com/feature/will-burtin/39476 [accessed 5 May 2021].

[63] Pierre Restany, 'La XXXII Biennale di Venezia, Biennale delle irregolarità', *Domus*, 417 (1964), 27-39 (p. 27).

[64] Ibid., pp. 27-39 (p. 38). In this context, the artist, by using the words 'folklore urbano', may be referring to Marshall McLuhan's work *The mechanical bride* (1951), where McLuhan uses the words 'Folklore of industrial man' with regard to advertisement and other communicational signs.

scambi fra i creatori e il pubblico loro contemporaneo'.[65] The words 'laboratorio sperimentale', 'centro di informazione' and 'scambi fra i creatori e il pubblico' once again highlight the significant changes of this period: from now on, art ought to be considered a social experiment that had to educate, conveying information. A fundamental concept is thus expressed, namely the relationship between artist and community; this can be considered the basis of every new artistic and cultural experimentation of the period. To exist, then, every artwork has to be related to both the subjects involved.

Thanks to the analysis of the social changes that occurred in Italy and the examination of the new exhibition choices of some of the main national exhibitions of the 1960s, it has become clear that this epoch was characterized by an industrial and technological renewal that brought about a different idea of artistic entertainment and engagement, in complete contrast to the more canonical definitions of art of the past. At that time, the definition and the function of art changed radically, moving towards a more interdisciplinary approach. In order to stimulate a reflection on Arte Programmata, we must resort to this social and cultural frame as it is a fundamental source of analysis for a better understanding of three questions: how is it possible to connect the concept of edutainment with Arte Programmata; how did programmed artists interpret it; and how did observers perceive the didactic and ludic features of these artworks? While these features were useful to improve the observer's engagement in major international exhibitions such as the 'XIII Triennale' of 1964 and the 'Esposizione Internazionale del Lavoro' of 1961, it is fundamental that we shed more light on artists' main reasons for using didactic and ludic features.

1.2 Umberto Eco: the Theorist of a Decade

Eco was a semiotician, critic and novelist, and a key figure in Italian post-war culture. During the 1960s, Eco developed the theory of the so-called *open work*, focusing his critique on an innovative, hypothetic model in order to define and explain the new orientation of contemporary art. The *open work* theory, along with the new concept of aesthetics as conceived by Bense (see Chapter 1, section 1.4), will be the primary source of my thesis, because Eco's theories played a crucial role in the development and definition of the Arte Programmata movement.

We could define an *open work* as a creative product that can be interpreted in multiple ways without its authenticity and unrepeatable singularity being altered. Each time, the work is enjoyed

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[65] Restany, 'La XXXII Biennale di Venezia, Biennale delle irregolarità', pp. 27-39 (p. 28).

and enacted in a new way; it is therefore performed and interpreted differently, because in each relationship with the consumer the work is characterized by an original and new perspective. The author or artist of an *open work* tries to promote the greatest possible 'opening' through the work itself, creating a network of infinite relationships with its users. It is a hypothetical *model* that outlines a possible direction taken by contemporary art,[66] and it is through this term – which Eco uses in the introduction to the second edition of his essay *Opera aperta* (1967) – that we may gain a better understanding of what Eco meant by 'open'. The model of *open work* can be considered a methodological choice: it theoretically represents its operational trend, its way of being and acting as a work of art, but it is also independent on the factual presence of a specific *open work*. The model is characterized by constant structural similarities that establish the *open work*'s consumption relationship with the observer. The model is applicable to works that are apparently irreconcilable with each other, but which present a structurally similar work/consumption relationship.[67]

In addition, in his explanation of the *open work* theory, Eco introduces the ideas of *form* and *structure*. An artwork is a form because it can be considered a summary of different experiential levels (i.e. ideas, emotions, ways of acting, and all the other features that might influence its creation). According to Eco, then, a form is the end point of a productive process and the starting point of a consumptive one. This idea implies a concept of fluidity and symbolizes a circular relationship: when the creation ends, the consumption starts.[68] Linked to the conception of *form* is that of *structure*. In order to introduce the analysable features of an *open work*, Eco traces different, intangible structural levels in the artwork: a system of relationships between the various stages that compose an artwork, including semantic, syntactic, emotional, physical and ideological stages. The *open work* can be broken down into relationships: the structure of an *open work* is therefore a *model* that can be similar for several works and that describes the specific consumption relationship with the receivers. In other words, it is a purely relational structure.[69] Eco clarified that this innovative point of view does not imply an interpretative homogeneity among the artistic expressions and the structures of reality, but that it limits itself to offering a common theoretical framework that helps to interpret the relationship between art and reality.[70] I will detail below how the concept of *structure* as theorized by Eco can be

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[66] Umberto Eco, *Opera aperta. Forma e indeterminazione nelle poetiche contemporanee*, pp. 16, 34-6.
[67] Ibid., p. 19-22. It is interesting to see how, in the introduction of the first edition of *Opera aperta*, in 1962, Eco did not include the word 'model', limiting himself to discussing 'structures'. The term 'model' – included in the second introduction of the book, in 1967 – refers to a more mature awareness of the scientific and aesthetic phenomena that developed during this decade. In other words, if at the beginning of the 1960s the definition of *open work* mainly converged with a factual artistic concept, at the end of the decade it became a wider, aesthetic theory, a 'means' to correctly read the interactions with 'I vari rami del sapere e le varie attività umane'. See also Ibid., p. 23.
[68] Ibid., p. 21.
[69] Ibid., p. 21-2.
[70] Ibid., p. 23.

compared to that conceived by Bense. Both ideas are essential to better comprehend, and methodologically approach, the role played by programming activities in Arte Programmata.

The concept of *open work* embodies three essential features that perfectly frame the interdisciplinary environment of the 1960s and, at the same time, specify the guidelines of the Arte Programmata movement, contextualizing it and highlighting its role as a symbolic art movement of its time. First of all, the principal idea behind the *open* conception of artwork is the notion of art as an *epistemological metaphor* for the time in which it developed.[71] The structural and relational model of an *open work* of art has similar features as other research models of modern culture, which means using similar defining models among various branches of knowledge or human activities.[72] More specifically, the way in which an *open work* is structured reflects the way in which the science or culture of a specific time views reality.[73] The *open work* of art is therefore born in concomitance, or in an explicit relationship, with the scientific, psychological, and logical methodological settings that characterise the modern approach to knowledge.[74] Artworks offer observers the right framework of interpretation to understand the problems of their current culture and, as a consequence, the correct tools to deal with new perceptual processes. Eco's theory is innovative because it attributes new value to the aesthetic canons of the time, a value that is shaped by the everyday context of society.[75] As an epistemological representation, an *open work* summarises – in its physical and theoretical essence – the key features of an epoch. This contextual approach clarifies and justifies the idea of the boundary crossing nature of the *open work*, which then becomes a model and a combination of structures inevitably also linked to the scientific environment: 'Il risultato non è una rivelazione circa la natura delle cose: è una chiarificazione circa una situazione culturale in atto, in cui si disegnano delle connessioni, da approfondire, tra i vari rami del sapere e le varie attività umane'.[76] This reflection clarifies and reveals the high interdisciplinary value of an *open work* that sees a community of intent and a similar approach in the different cultural attitudes. In his theoretical book, Eco himself specified that the interdisciplinary approach of the *open work* is an epistemological metaphor. Art therefore assumes the commitment to be a structural metaphorization of the modern vision of the world:

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[71] Ibid., p. 3.

[72] Ibid., pp. 23-4.

[73] Ibid. p. 50.

[74] '[…]Si è cercato cioè di vedere come i programmi operativi degli artisti presentassero delle analogie con programmi operativi elaborati nell'ambito della ricerca scientifica contemporanea. In altri termini si è cercato di vedere come una certa concezione dell'opera nascesse in concomitanza o in esplicita relazione con impostazioni delle metodologie scientifiche, della psicologia o della logica co temporanea'. Ibid., p. 16.

[75] 'Un artista elabora un "modo di formare" ed è conscio solo di quello, ma attraverso questo modo di formare si palesano […] tutti gli altri elementi di una civiltà e di un'epoca'. Ibid., p. 4.

[76] Ibid., p. 23.

Stabilire questa unità significa da un lato chiarire sino a che punto una cultura sia omogenea, dall'altro cercare di realizzare su base interdisciplinare, a livello dei comportamenti culturali, quell'unità del sapere che a livello metafisico è risultata illusoria ma che pur tuttavia va tentata in qualche modo, per rendere omogenei e traducibili i nostri discorsi intorno al mondo.[77]

Drawing on the active conception of art as a model that can be adapted to every type of consumption, Eco next introduces the concept of *movement*. Starting from a general perspective, he describes the movement as one that symbolises the lively social, technological and scientific progress accomplished during those years. However, Eco accurately describes these types of objects as artistic products where the consumer's consumption is different each time.[78] In the author's words, this is a straightforward reference to the visual research carried out by Arte Programmata artists, for whom the dynamism and relativism of perspectives was a central element.[79] In Eco's opinion, an *open work* is characterized by an ontological dynamism that is in line with the modern times in which it has been created; dynamism leads, then, to a new sense of democracy for the artistic experience that is indeed customised and based on the singular observer's perception. Interpretative relativism always implies new perceptual variables and fluidity in consumption experiences. According to Eco, the opening and the dynamism of the new modern artwork inevitably leads to new communicative situations between the observer and the artistic product, in terms of the contemplation and use of the object.[80] In his description of this relationship, Eco stresses the importance of a perceptual ambiguity that offers the possibility of analysing reality without addiction and habit. Each object is therefore dynamic, as it potentially contains every type of 'opening' or different fruition relationship.[81]

This peculiar attention to the individual experience, this opening towards a personal, aesthetic interpretation in which the observer plays a crucial role, is the third essential element of the notion of *open work*. Eco theorized that an *open work* must be 'finished' by the observer: in order to exist, the artwork must be enacted and enjoyed by the user, who becomes a real consumer of the artistic experience.[82] Observers include in their reaction to the artwork their own sensitivity, accentuated by their own life experiences; for this reason, the understanding of the artistic product is modulated by

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[77] Ibid., p. 24.
[78] Ibid., p. 51.
[79] 'Il fenomeno dell'*opera in movimento*, nella presente situazione culturale, non è affatto limitato all'ambito musicale, ma trova delle interessanti manifestazioni nel campo delle arti plastiche, dove troviamo oggi degli oggetti artistici che in se stessi hanno come una mobilità, una capacità di riproporsi caleidoscopicamente agli occhi del fruitore come perennemente nuovi'. See Ibid., p. 46.
[80] Ibid., p. 63.
[81] Ibid., pp. 53-55.
[82] Ibid., p. 58.

a personal perspective.[83] The extreme rationality and democracy of the term 'consumer' – so close to the industrial and scientific environment – is in sharp contrast to the principal function of the 'observer' who is supposed to add artistic enjoyment: a subjective emotional response that differs from observer to observer based on their culture and their existential situation.[84] Hence, it is clear that contrasts, tensions and dichotomies are the essence of this visual revolution and that they represent – from an aesthetic point of view – the social, economic and political contradictions that characterised Italy in this period. Eco himself poses this question to the reader in the first chapter of *Opera aperta*, where he asks if interpretative relativism and dynamism express a condition of social instability or symbolise a new era where science and human beings are united to create a different idea of progress.[85] We will see how useful this sense of instability and interpretative relativism, which is indispensable to 'finish' and 'complete' the framework of an *open work*, was for the Arte Programmata artists in their attempt to give their own definition of and meaning to the term 'programming' (see Chapter 2).

The increasing importance of the user's point of view and of a more democratic enjoyment of art leads us to another crucial phenomenon that arose in those years: the new role of mass culture. As Eco explained in the preface to the essay *Apocalittici e integrati. Comunicazioni di massa e teorie della cultura di massa* (1964), during the second half of the 1950s and throughout the 1960s, Italy witnessed a rapid dissemination of new media, which almost instantly entered every Italian home. The most influential was the television set, but magazines, radio, cinema and comic strips were also important. Scholars and philosophers fiercely debated the broader accessibility to cultural content caused by the increase in new forms of mass media that provoked opposing reactions, which once again testify to the contradictions and the divergences of those years. According to Eco, a number of 'apocalyptic' critics had introduced the term 'anticultura' to define an irrecoverable situation, where a forced adjustment to the masses' receptive capacity did not offer people the opportunity for a critical and formative experience. Others, instead, were interested in the role of mass media in the popularization of culture; they acknowledged the impossibility of avoiding 'a mass presence' in the cultural world, thus demonstrating a more integrated attitude within the historical context of the moment.[86] This is because it was impossible to deny that the masses had by then become the protagonist of history, transforming cultural operators into 'funzionari dell'umanità'.[87] Furthermore, the possibility of replicating cultural goods through industrial procedures, which Eco compared to

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[83] Ibid., p. 34.
[84] Ibid.
[85] Ibid., p. 56.
[86] Umberto Eco, *Apocalittici e integrati. Comunicazioni di massa e teorie della cultura di massa* (Milan: Bompiani, 2011), e-book (Preface, location 294-299).
[87] Ibid., (Preface, location 391).

Gutenberg's invention of the printing press because of its cutting-edge component, enhanced the conditions for a broad section of society to enjoy cultural content.[88]

Hence, the connection between viewer, environment and means of communication is unavoidable.[89] The reshaped role of the new artists placed them closer to the social environment in which they lived, exposing them to the need to identify the real connection between people and cultural content. As we will see, this trend gave rise to new disciplines such as Bense's idea of aesthetics, or cybernetics: the latter tried to fill the gap – with the help of technology – between the new role of the artist, defined by Eco as an 'artistic operator', and the users of artistic products.

1.3 Gillo Dorfles: an Aesthetic Investigation of Modern Times

Dorfles was an intellectual, critic, philosopher and one of the most important Italian exponents of post-war aesthetics. Along with Eco, he focused his attention on the Italian cultural environment of the 1960s. A prolific author, Dorfles was one of the main protagonists of the Italian intellectual scene of the 1960s, thanks to the production of various key studies on the development of a new modern aesthetics and to his acute, contextual analysis of the social and technological environment of the time. He analysed every aspect of the arts, from their anthropological role to their scientific one. Thanks to works such as *Discorso tecnico delle arti* (1952), *Le oscillazioni del gusto* (1958 and 1970), *Il divenire delle arti* (1959), *Il disegno industriale e la sua estetica* (1963) and *Nuovi riti, nuovi miti* (1965), he defined the bases of a new critical approach, theorizing a novel concept of art that should never be considered as disconnected from its own social and technological context. Within his ample production, the themes that can be considered most relevant to frame the cultural debate of the epoch and to analyse the avant-garde artistic expression of Arte Programmata are as follows: the relationship between art, communication and mass culture; the role of human perception in the definition of the meaning of art; the importance of the context and the observer as intrinsic elements of the artwork; the prominence of an interdisciplinary point of view that can fully understand how art operates. Like Eco, Dorfles offered – in his writings – a lens through which to describe the socio-cultural context in which Arte Programmata developed and a new approach to understand and justify the presence,

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[88] Ibid., (Preface, location 340-347).
[89] '"Cultura di massa" diventa allora una definizione d'ordine antropologico, […] valida ad indicare un preciso contesto storico (quello in cui viviamo) in cui tutti i fenomeni comunicativi – dalle proposte di divertimento evasivo agli appelli all'interiorità – appaiono dialetticamente connessi, ricevendo ciascuno dal contesto una qualificazione che non permette più di ridurli a fenomeni analoghi apparsi in altri periodi storici'. Ibid., (Preface, location 416-419).

between the 1950s and 1960s, of a type of production that had an industrial character, but with aesthetic and communicative purposes.

The first essential concept that Dorfles developed is the importance of having a clear awareness of the strong relationship between art and communication. As he explained in the lecture notes of the aesthetics course held at the Università degli Studi di Milano between 1969 and 1970, art is the first means of communication that informs us of the social situation of past human communities.[90] He posits an inevitable link between aesthetic expressions and communication; indeed, for him it is impossible to imagine a form of art that lacks intersubjective communication. In other words, the presence of a viewer is necessary to complete the meaning of art and to consider it as authentic. The aesthetic expression therefore has an intrinsic communicative function that is not limited to the relationship between the object and the artist/creator.[91]

Focusing on the artistic tendencies of the 1960s, where the use of abstraction and the heritage of the Informale movement dominated the Italian artistic context,[92] Dorfles identified an urgent aspect of communication that had to be debated: the absence of communicative immediacy in contemporary art.[93] Citing *Art as Experience* (1934) by the American philosopher John Dewey (1859–1952), Dorfles agreed with the statement that art is a type of language that must be 'learned' to be entirely understood.[94] In other words, communication through art, as art itself, must be studied and learned in order to be fully assumed. Dorfles here introduced a concept that may be connected to the birth of the Arte Programmata movement. The critic stated that communication through art should often be 'stimulated' and 'pushed': 'La comprensione dell'arte solo in parte è innata, istintiva, autonoma; anche l'arte deve essere "imparata"; anche la comunicazione attraverso l'arte per avvenire deve spesso venire sollecitata'.[95] This theory could easily be linked to the role of artistic communication

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[90] 'L'arte costituisce l'unico, o almeno uno dei primissimi elementi capaci di informarci sulle situazioni sociali delle più antiche comunità umane'. Gillo Dorfles, *Arte e comunicazione: comunicazione e struttura nell'analisi di alcuni linguaggi artistici* (Milan: Electra, 2009), p. 20.

[91] Gillo Dorfles, 'Comunicazione simbolica e comunicazione critica nell'opera d'arte [1957]', in *Estetica senza dialettica: scritti dal 1933 al 2014*, ed. by Luca Cesari, pp. 191-200 (p. 191) (first publ. in *Rivista di Estetica*, III, 1 (1957), 142-149).

[92] The Informale, literally 'without a shape', is a post-war artistic trend that developed both in the United States and in Europe. Generally, what characterizes its style is the artist's emotional participation in the artistic creation as well as their deep focus on the materiality of the artwork, playing with different materials, colours and textures. While in the USA artists worked more on the concept of 'gesture', in Italy they focused on the use of materials, such as, Alberto Burri or the sculptor Leoncillo Leonardi. Some artists worked, instead, on a historical reflection on the consequences of the Second World War and fascism. One of the major examples of this politically active Informale is Emilio Vedova's production. The main Italian critics who theorized this movement and thus contributed to its reception and fortune are Giulio Carlo Argan, with *Salvezza e caduta dell'arte moderna* (1964), Renato Barilli *L'Informale e altri studi di arte contemporanea* (1964), and Cesare Brandi with the article 'Significato dell'Informale' (1964).

[93] Dorfles, 'Comunicazione simbolica e comunicazione critica nell'opera d'arte [1957]', in *Estetica senza dialettica: scritti dal 1933 al 2014*, pp. 191-200 (p. 196).

[94] John Dewey, *Art as Experience* (New York: Milton, Balch & Company, 1934), p. 288.

[95] Dorfles, 'Comunicazione simbolica e comunicazione critica nell'opera d'arte [1957]', in *Estetica senza dialettica: scritti dal 1933 al 2014*, pp. 191-200 (p. 196).

in Arte Programmata, in particular the use of multisensory stimuli and the impact of recreational elements that allow visitors to literally 'play' with the artworks. One of the main research questions linked to Dorfles's ideas is, in fact, the relationship between didactic and ludic elements in programmed artworks that make this movement unique in the artistic panorama of those years.

The active role of the consumer and the idea of a structured artwork with precise purposes are some among a number of shared features in Eco's and Dorfles's aesthetic theorizations of the time. Dorfles, in his essay *Le oscillazioni del gusto* of 1958, investigated concepts – like relativism and dynamism – that can be found in Eco's writings few years later: '[…] solo partendo dal principio d'una continua metamorfosi posta a base della vita artistica possiamo tentare di individuare in che cosa consistano il fenomeno comunicativo dell'arte e il suo continuo mutarsi'.[96] The keyword of this passage is 'metamorfosi' which perfectly symbolises the sense of fluidity and perpetual change that is typical of this period. Moreover, it anticipated the idea of movement and dynamism in artistic consumption that Eco described in *Opera aperta*. Dorfles perceived a great sense of instability and uncertainty in the assumption that art has a communicative power, and questioned whether it could still have a role in the development of contemporary society.[97] The best answer that he could find was the analysis of the phenomenon of mass communication and its means, such as television, radio and cinema – these represented the new symbols of mass culture and the tools for spreading a new kind of cultural content.

This general ambiguity about the communicative role of art is firmly related to what Dorfles called a stratification of taste and values in the article 'Art and the Public: Education for Mutual Understanding', published in 1958 in *The Journal of Aesthetics and Art Criticism*.[98] In Dorfles's opinion, in that period there was a vaster production of art than ever before. He described the situation using a very realistic image: 'Man is surrounded by a real flood of figurations, sounds, and forms which we must define as "artistic" but whose value is extremely limited'.[99] Dorfles thus highlights the sharp increase in low-level cultural content due to the extensive presence of means of mass communication; this phenomenon brought about an increase in cultural products, but at the same time also a relativism in terms of taste – a reduction in the quality of content, and the end of common appreciation and a commonly shared aesthetic code in art.[100] This depiction of the cultural situation on the threshold of the 1960s will be further explored by Eco in his milestone work, *Apocalittici e*

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[96] Gillo Dorfles, 'Le oscillazioni del gusto. L'arte di oggi tra tecnocrazia e consumismo [1958]', in *Estetica senza dialettica: scritti dal 1933 al 2014*, pp. 217-316 (p. 295).

[97] Dorfles, *Arte e comunicazione: comunicazione e struttura nell'analisi di alcuni linguaggi artistici*, p. 21.

[98] Gillo Dorfles, 'Art and the Public: Education for Mutual Understanding [1958]', in *Estetica senza dialettica: scritti dal 1933 al 2014*, pp. 201-212 (p. 202) (first publ. in *The Journal of Aesthetics and Art Criticism*, XVI, 4 (1958)).

[99] The term 'surrounded' here underlines the power of context for a man of the 1960s, in his definition of tastes regarding artistic products. Dorfles, 'Art and the Public: Education for Mutual Understanding [1958]', pp. 201-212 (pp. 202-203).

[100] Dorfles, 'Le oscillazioni del gusto. E l'arte moderna [1958]', pp. 217-316 (p. 250).

integrati, where he described the dichotomy between intellectuals with regard to the real value of mass culture. This condemnation of the proliferation of 'low-brow' art reflects Dorfles's pessimism, 'whose solution is far from being clear'.[101] In his opinion, mass media are responsible for the increasing stratification and relativism in the art world. While high art had played a dignified role in the past, between the 1950s and the 1960s Dorfles perceived a deep gap between connoisseurs and the taste of the public.[102] It is possible to discern a lingering elitism in Dorfles who – from Eco's point of view – could be defined an 'apocalittico'.

The divorce between 'true' art and the new generations had different causes, which strongly influenced the public; Dorfles locates these causes in social, ethical, technical and psycho-sensorial contexts.[103] For the critic, it is evident that the artwork adapts to the new changing society; art therefore adapted itself to the new, dynamic and multi-stimuli social environment of the 1960s.[104] The birth of new materials and the development of new techniques are equally responsible for the creation of a new type of art that is separated from the past and that communicates through a new expressive language.[105] We will see how Arte Programmata, which Dorfles dealt with for a long time, is characterized by this combination of avant-garde materials and creativity, in the search for a direct and fruitful relationship with the observer.

Dorfles did not fail to include the ethical consequences of this emerging phenomenon in his analysis of the relationship between art and mass culture: what he defined as 'mechanical art' generates a 'pseudo-artistic work whose reception is only partially voluntary'.[106] The same ethical approach can be evidenced a few years later in Eco's *Apocalittici e integrati*, where the writer – with regard to the apocalyptics' critique of mass culture – underlined that 'i mass media tendono a provocare emozioni vive e non mediate; in altri termini, invece di simboleggiare una emozione, di rappresentarla, la provocano; invece di suggerirla, la consegnano già confezionata'.[107] Dorfles reclaimed the concept of unwilling absorption of low artistic content in *Le oscillazioni del gusto* (1958), specifically in the chapter titled 'Radio, televisione e i pericoli della meccanizzazione dell'arte', where he divides these products into two categories.[108] The first group of artistic content is generated by those means of communication that have mechanical features, such as television,

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[101] Dorfles, 'Art and the Public: Education for Mutual Understanding [1958]', pp. 201-212 (p. 203).
[102] Ibid., p. 204.
[103] Ibid., p. 207.
[104] '[…] Eppure non si è forse ancora sufficientemente ripetuto come una delle metamorfosi più acute e sostanziali, del nostro odierno universo percettivo e fenomenico, sia proprio quello di trovarci immessi entro un continuo alone cinetico dal quale ormai ben difficilmente potremo disincagliarci'. Gillo Dorfles, 'Simbolo comunicazione consumo [1962]' in *Estetica senza dialettica: scritti dal 1933 al 2014*, pp. 747-943 (p. 918).
[105] Dorfles, 'Art and the Public: Education for Mutual Understanding [1958]', pp. 201-212 (p. 208).
[106] Ibid., p. 209.
[107] Eco, *Apocalittici e integrati. Comunicazioni di massa e teorie della cultura di massa*, (location 781-784).
[108] Dorfles, 'Le oscillazioni del gusto e l'arte moderna [1958]', pp. 217-316 (p. 306).

radio and records; the second derives from new media, such as cinema, artistic photography and electronic music. Hence, when compared to simple means of reproduction, new media possess more creative and expressive features.[109]

The last cause behind the oscillations in taste is the changing psycho-sensorial context. In order to explain this to his readers, Dorfles introduced a fundamental concept: the importance of 'percezione specializzata'.[110] This kind of perception is linked to the epoch in which it develops, and it is strictly related to psycho-sensorial causes. Reinterpreting the thoughts of art historian Heinrich Wölfflin, Dorfles stressed the importance of the artist's optic capacity and the extent to which the latter differed from that of the observer.[111] In the critic's view, a correct aesthetic and psychological analysis of the problem of taste cannot avoid a detailed study of perceptual rules:

> […] Bisognerà invece ammettere una diversità di *percezione specializzata* che corrisponda ad una diversa capacità percettiva dell'uomo a seconda delle epoche e che dipenda solo in parte da cause sociali, o da cause scientifiche, ma soprattutto, invece da cause psicologico-sensoriali.[112]

Every epoch therefore has its own 'percezione specializzata' and it is therefore not possible to fully analyse the relationship between the artwork and its historical period without using this particular lens. Dorfles's work of art is *open* as per Eco's formulation, because it is shaped by philosophical aspects and scientific phenomena.[113] This feature underlines the high interdisciplinary value of his research in those years and the connotation of the concept of 'opening' that emerges from his words.[114]

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[109] For a better understanding of the concept of 'medium', it may be useful to refer to Wolf Werner's definition of 'Intermediality' in the *Routledge Encyclopedia of Narrative Theory*: '[…] Media as conventionally distinct means of communicating cultural contents. Media in this sense are specified principally by the nature of their underlying semiotic systems (involving verbal language, pictorial signs, music, etc.; or, in cases of 'composite media' such as film, a combination of several semiotic systems), and only in the second place by technical or institutional channels.' Wolf Werner, 'Intermediality' in *Routledge Encyclopedia of Narrative Theory*, ed. by David Herman, Manfred Jahn, Marie-Laure Ryan (London: Routledge, 2010), pp. 252-256 (p. 253).

[110] Dorfles, 'Le oscillazioni del gusto e l'arte moderna [1958]', pp. 217-316 (p. 268).

[111] Heinrich Wölfflin, *Kunstgeschichtliche Grundbegriffe* (Munich: Bruckmann, 1915). Dorfles, 'Le oscillazioni del gusto e l'arte moderna [1958]', p. 269.

[112] Dorfles, 'Le oscillazioni del gusto e l'arte moderna [1958]', pp. 217-316 (p. 268).

[113] 'Se invece rivolgiamo la nostra attenzione all'importanza dell'elemento percettivo in quella che è la fruizione dell'opera d'arte, specie per quanto si riferisce all'evidente mutarsi di essa attraverso i tempi, dovremo dare ogni importanza allo studio delle trasformazioni cui va incontro il nostro atteggiamento – non solo psicologico, ma addirittura fisiologico – verso il mondo esterno, e quindi il mutuarsi incessante seppur impercettibile dei nostri percetti'. Gillo Dorfles, 'Il divenire delle arti [1959]', in *Estetica senza dialettica: scritti dal 1933 al 2014*, pp. 427-693 (p. 440).

[114] To summarize, in the chapter 'Arte e Comunicazione' of his book *Le oscillazioni del gusto. L'arte di oggi tra tecnocrazia e consumismo*, Dorfles gives a very scientific definition of 'taste': it has to be linked to psychological, perceptual and technical reasons. Dorfles, 'Le oscillazioni del gusto. e l'arte moderna [1958]', pp. 217-316 (p. 273).

In *Il divenire delle arti* (1959), Dorfles gave a clear definition of perception: the sum of sensorial data and mnemonic, ethic, aesthetic and decision-making elements. According to him, human beings are in fact in constant becoming: they are stimulated simultaneously by both the multi-stimuli environment and their own experiences.[115] Drawing on the lecture notes of the aforementioned aesthetics course held between 1969 and 1970, he described the awareness that everything is subject to the law of becoming as a perpetual component of a person's life, which influences their perceptual paradigm.[116] The ideas of swiftness and obsolescence are implied in all the activities that are 'consumed' by people in this period, for example cinema or television, where they witnessed the rapid consumption of images. This ontological essence of dynamism and transition is, then, dominant in every aesthetic situation:

> È un errore non dare la dovuta importanza ad alcuni dei fattori dominanti nell'attuale situazione artistica come: la *rapidità del consumo*, l'*obsolescenza* (invecchiamento) e l'*usura delle forme* e delle *immagini* […] l'importanza crescente delle sollecitazioni cinetiche e in genere del 'senso del movimento' nella determinazione di forme artistiche e nel condizionamento del comportamento umano.[117]

This focus on ephemeral and transient moments inevitably led to the birth of a type of art that continuously modifies itself: one whose consumption is dynamic, as in Arte Programmata.

According to Dorfles, the context is crucial for artistic research and for the definition of people's 'percezione specializzata'. The critic stressed that the new perceptual setting was the result of evident changes in everyday life. First of all, he drew attention to the massive improvement in public transport that had completely changed people's routines. Secondly, he referred to a diverse awareness of time and to a chronological instability that changed the time management of the new generation. He emphasised the increasing consumerism and the relatively rapid obsolescence of industrial and artistic products, describing their fast consumption as a temporal action. In *Nuovi riti, nuovi miti* (1965), the author once again stressed his interdisciplinary approach; he defined these features of modern times as the signs of a 'tempo plastico' that can also be explained as a 'curvo',

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[115] '[…] Considerare come nostra prerogativa umana quella di venire continuamente aggiungendo e integrando ciò che i dati della nostra sensorialità ci offrono con quanto l'ambiente e l'esperienza ci vengono sottoponendo' Dorfles, 'Il divenire delle arti [1959]', pp. 427-693 (p. 449).

[116] 'Credo che questo fenomeno sia radicato nelle stesse strutture della nostra odierna società: viviamo in un mondo dove l'elemento cinetico impera; il semplice fatto di vedere scorrere il traffico stradale o di parteciparvi attivamente ci abitua e condiziona ad una rapidità nel mutarsi delle nostre abituali prospettive. Ne risulta sollecitata la nostra capacità di rapida percezione (e di rapida sintesi) […]'. Dorfles, *Arte e comunicazione: comunicazione e struttura nell'analisi di alcuni linguaggi artistici*, p. 24.

[117] Ibid. p. 23.

paying homage to the theory of relativity and research on black holes that was being carried out in those years.[118]

As for the new idea of time, Dorfles highlighted how the conception of space was changing, becoming more and more imaginative.[119] Space discoveries and studies on the structure of the atom, whose results and data can only be presented through projections or scale models, can be considered as examples of imaginative space.[120] In Dorfles's words, this distortion of common and stereotyped ideas of space and time influenced the creation of dynamic artworks that forced the usual concepts of space and time and stimulated our perception, as, for example, in the case of Alexander Calder.[121] A reference to the concept of art as *open* and characterized by an interdisciplinary approach clearly emerges here.[122]

At this point, it is worth focusing our attention on the Dorfles's idea of the observer's role. In the article 'Gergo filosofico ed estetica', published in 1955 in *Aut Aut*,[123] Dorfles noted that it is always the subjective element of consumption that transforms a simple physical object into a work of art. The consumers, through the artwork's expressive media, experiment with their own reaction and involve their subjectivity – which is based on previous experiences and on their relationship with the surrounding environment – in the artistic experience. This concept anticipated the observer's role in Eco's definition of *open work*: without an observer, the work of art is 'unfinished'. Hence the necessity for an artwork to engage in an interpretative dialogue with the observer if it is to be executed.[124] In Dorfles's opinion, there is not just one type of consumption: the interpretations and forms of consumption are unlimited, as they are interconnected with the observer's individual personality. Moreover, based on the sensitivity of different epochs, the artwork will take on different readings.[125]

To complete this brief analysis of Dorfles, it is also important to consider the interdisciplinary approach that guided him in his writings. In this regard, *Simbolo comunicazione consumo* (1962) may

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[118] Gillo Dorfles, 'Nuovi riti nuovi miti [1965]', in *Estetica senza dialettica: scritti dal 1933 al 2014*, pp. 1043-1287 (p. 1158).

[119] Ibid., p. 1160.

[120] 'Mi sembra comunque interessante notare come la presenza di tali aspetti stia a dimostrare come nella nostra epoca si venga sviluppando una certa quale aleatorietà nella concezione della realtà crono-topologica, di problematicità delle dimensioni spazio-temporali, quale, credo, non si dette mai per il passato.' Ibid., p. 1161.

[121] Ibid., pp. 1158-9.

[122] 'È proprio l'indiscutibile analogia individuabile tra struttura in cui l'idea artistica s'incarna, e strutture sociali, scientifiche, tecniche dell'epoca che ci permetterà di concepire il fenomeno artistico nella sua peculiare ed essenziale posizione sincronica: come un elemento vivente in una contemporaneità con le altre condizioni epocali.' Gillo Dorfles, 'Artificio e natura [1968]', in *Estetica senza dialettica: scritti dal 1933 al 2014*, pp. 1365-1582 (p. 1553).

[123] Gillo Dorfles, 'Gergo filosofico ed estetica [1955]', in *Estetica senza dialettica: scritti dal 1933 al 2014*, pp. 167-171 (p. 167) (first publ. in *Aut Aut*, (26 March 1955)).

[124] Eco, *Opera aperta. Forma e indeterminazione nelle poetiche contemporanee*, p. 58.

[125] Dorfles, 'Le oscillazioni del gusto e l'arte moderna [1958]', in *Estetica senza dialettica: scritti dal 1933 al 2014*, pp. 217-316 (pp. 300-301).

be useful to understand the role of critics in the correct interpretation of an artwork. Influenced by his academic background, Dorfles aspired to the development of a real scientific approach – one that refused idealistic, sentimental, redundant and emphatic comments, preferring a more rational approach to the work of art. The critic, in Dorfles's opinion, should be equipped with a strong 'quoziente scientifico' in order to be able to approach the artwork with the appropriate scientific, technical and historical expertise. These qualities should be intertwined with the right amount of 'quoziente intuitivo', that is, the critic's sensitivity. This innovative methodology ought to play a crucial role in helping ordinary people to comprehend contemporary art, which – in the author's opinion – was still too obscure for non-specialists. The use of simple scientific and psychological laws would, then, make the artwork's structure clearer to the observer's eye.[126] As we will see in my analysis of Arte Programmata artworks, the identification of both a rational phase and one more related to unpredictability proved crucial for the complete understanding of the movement.

To conclude, both Eco and Dorfles interpreted the work of art as a totality that connects a rational and aesthetically exact structure with an unstable essence, where the audience acts under the influence of their context and subjectivity. More generally, the two critics evoked the image of an artwork that is actively didactic and ludic, a dynamic artwork that must be 'finished' through the observer's direct participation. In the next chapters, we will see if this theory of a dual-essence work of art found a valid implementation in the Arte Programmata movement.

1.4 A New, Modern Concept of Art in the 1960s: Max Bense and Abraham A. Moles

The analysis of the social and cultural environment of this historical period inevitably requires an investigation of the function of the artwork in a changing society. This interpretation of the concept of art is based on the theoretical production of two philosophers and aestheticians who were interested in applying information theory to aesthetic questions: Moles and Bense.[127] Their effort to combine

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[126] Dorfles, 'Simbolo comunicazione consumo [1962]' in *Estetica senza dialettica: scritti dal 1933 al 2014*, pp. 747-943 (pp. 804-805).

[127] Bense studied mathematics, philosophy and physics. He developed the concept of information aesthetics, which the organizers of the international event and exhibition 'tendencjie 4' – entirely focused on concrete, constructive and kinetic art as well as on the new idea of art as 'research' beyond the rules of the art market – declared the theoretical basis of visual research using computers. Bense's most important publication about information aesthetics is *Aesthetica. Einführung in die neue Aesthetik* [*Aesthetica. Introduction to the New Aesthetics*] of 1965. Bense was a significant source of inspiration in the genesis of computer-generated art: in 1965, he presented the world's first computer-generated graphics, designed by Georg Nees at the Colloquy on Aesthetics in Stuttgart. By contrast, Moles, whose principal publications are *La création scientifique* of 1957 and *Théorie de l'information et perception esthétique* of 1958, was more oriented towards semiotics, combining cybernetics with information theory, experimental psychology and explanatory models from social sciences.

philosophy, psychology, aesthetics, social sciences and art theory has made their theoretical writings a source of both inspiration and debate for the Italian groups that were engaged in the theorization and implementation of Arte Programmata works. I will explore the works of Bense in more detail below (see Chapter 4), but in this chapter it is necessary to introduce the bases of their research so as to contextualize the environment in which Arte Programmata works were born. This analysis will help us understand the needs and doubts of scholars and artists active in this period of great aesthetic upheaval.[128]

Dorfles referred to Moles as 'il maggiore cultore dell'applicazione all'estetica della teoria dell'informazione'.[129] Moles's theories, in fact, support Dorfles's conception of art as a communicative link between the observer and the artist. The French sociologist and philosopher's most essential concepts were summarized in the first issue of the journal *bit international*, published in 1968.[130] Moles's assumption starts from the premise that the essence of a work of art does not lie in its originality, but in its reproducibility. The fact that mass media products can now be reproduced in countless copies completely cancels out the conception of novelty. In modern civilization, the user's active participation in any creative process has disappeared; the observer, who loses the possibility to actively participate in the creation of the artwork and passively receives a 'ready-to-use product', is subjected to a real cultural alienation.[131] In essence, society voraciously consumes novelty; consequently, the problem arises of artistic originality and how to permanently renew that originality, since it is the creative act that defines the cultural dynamism of a society. From Moles's point of view, it is at this point that the key figure of the aesthetician must come into play in order to tackle the problem of how the artistic message is received and perceived. The aesthetician's task is therefore to create a working method for the artist, a rational one based on algorithms, which allows

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[128] Marco Meneguzzo, an art historian specialized in kinetic movements, describes the environment where, at the time, Moles's theories started to be studied and how these ideas were communicated to the Arte Programmata groups of the period as follows: 'Come per Bense, anche la conoscenza di altri studiosi e teorici – come Moles, appunto – veniva da scritti sparsi, utilizzati magari in qualche catalogo. La nozione di cibernetica, per esempio, di cui si stava occupando Moles, era allora di moda, anche se probabilmente nessuno degli artisti considerati aveva letto integralmente i suoi saggi. È invece assai probabile che queste idee, passate attraverso traduzioni in francese dell'originale inglese, siano state diffuse in ambiente artistico dai componenti del GRAV: spesso citato è, per esempio il saggio, "Complessità funzionale e strutturale", tratto da *La notion de quantité en cybernétique*, pubblicato nella rivista *Les Études Philosophiques*, n. 2, aprile-giugno 1961'. Marco Meneguzzo, *Arte Programmata cinquant'anni dopo*, (Monza: Johan & Levi Editore, 2012), e-book (location, 720-727).

[129] Gillo Dorfles, 'Rapporti tra informazione e valore nell'opera d'arte' [1960]', in *Estetica senza dialettica: scritti dal 1933 al 2014*, ed. by Luca Cesari, pp. 722-724 (p. 722) (first publ. in *Atti del IV Convegno internazionale di estetica*, Athens (1960)).

[130] Abraham A. Moles, 'L'esthétique expérimentale dans le nouvelle société de consommation', *bit international*, I (1968), 73-79 (repr. in *A little-know story about a movement, a magazine, and the computers arrival in art: new tendencies and bit international, 1961-1973*, ed. by Margit Rosen (Karlsruhe: ZKM, 2011), pp. 300-303.

[131] These words recall Eco's observations in the groundbreaking text, *Apocalittici e integrati* (see Chapter 1.2).

the artist to answer a fundamental question: 'How can ever renewed originality be provided for an expanding, educated audience?'.[132]

When it comes to the idea of consumption, what matters to Moles is the possibility to adopt new methods that exploit every facet of perceptible reality in order to make it interesting and fascinating. Moles focused on the idea of a new type of art that investigates 'the unexplored channels of tactile, olfactory, thermal – or other – sensibility, by providing new thrills, since the old ones are threatened with obsolescence'.[133] Through 'sensory combinatorics', the aesthetician and the artist create a new type of art and demonstrate how technology can open up new fields of action. What emerges from Moles's words is the contemporary need to go beyond the idea of art as a concept linked to materiality and uniqueness. In a society of mass media consumption, it is only possible to refer to 'artistic situations'.[134] The role of the artist has therefore changed into that of a simple 'programmer of the beautiful',[135] who relies on the aesthetician's work and experiments with the rational combination of perception of originality, semantic pleasure, and aesthetic one. Moles's conclusion is paramount to the continuation of this research and summarizes, once more, the strong push towards an interdisciplinary type of research in the artistic field of that period, which we have already seen before:

> Then, there is the role of the aesthetician, who is no longer a philosopher now, but a laboratory-based social psychologist, who defines the rules of the perception of originality, the socio-dynamic mechanisms of its dissemination, the laws of combinatorics, and the algorithms of machine programming and who enters into collaborations with the artist, working as a part of his team.[136]

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[132] Moles, 'L'esthétique experimentale dans le nouvelle société de consommation', pp. 300-303 (p. 301).

[133] Ibid., p. 302.

[134] Ibid.

[135] Ibid. This expression refers to the term 'operator', which Eco used on different occasions to define a new concept of artist and to relocate the latter in the artistic environment of the period. '[…] Ora tutti gli uomini si sono avviati a diventare suoi simili, e l'operatore di cultura ha cessato di essere il funzionario di un committente per essere il "funzionario dell'umanità". Porsi in rapporto dialettico, attivo e consapevole, con i condizionamenti dell'industria culturale, è diventato per l'operatore di cultura l'unica via per espletare la sua funzione'. Eco, *Apocalittici e integrati*, (Preface, location 390-393). For Moles, the cultural operator is now no more than an element of a group or team, the one responsible for the creation of aesthetic and rationally exact structures in constant dialogue with a new type of stakeholder.

[136] Moles, 'L'esthétique experimentale dans le nouvelle société de consommation', pp. 300-303 (p. 303). A renovated concept of the interdisciplinary role of the philosopher is also expressed by Eco, in his book *La definizione dell'arte*, where he states: '[…] Il filosofo, […] assolverebbe interdisciplinarmente al suo compito di *tecnico del Tutto*; […] il che tuttavia richiederebbe che il filosofo non fosse più uno studioso isolato, ma qualcuno che lavora in continuo contatto con gli altri, per verificare continuamente i modelli che elabora e decidere della loro attendibilità solo nel vivo di una attività, aperta e progressiva, di confronto'. Umberto Eco, *La definizione dell'arte*, (Milan: U. Mursia & C., 1968), p. 287.

The '"scientization" of artistic practices and the "aestheticization" of scientific methodology' therefore contribute to the definition of a new art theory capable of activating the observer's engagement.[137] This demonstrates a clear and positive attitude towards interdisciplinary influences in art, especially those with a scientific nature. In fact, Dorfles – in his essay *Simbolo comunicazione consumo* (1962) – emphasised the concept of a freer art resulting from the impact of science, which objectifies and democratizes the artistic content.[138] The artists' products can therefore be interpreted as 'projects', a word that once again evokes an idea of art in progress that fosters ever new concepts and evolutions.[139] Thus, a new idea of art clearly emerges, one that is considered an experiment made possible by very common means of production and that testifies to the idea of programmed and controlled aesthetic information in constant dialogue with the consumer.

Bense's theories of aesthetics reproduce this reflection on a new function and definition of the artwork. In the Italian edition of one of his major works, *Aesthetica* (1965), all the aforementioned radical changes that occurred in this decade in terms of visual research are clearly recognizable.[140] In the introduction, entitled 'Intorno all'estetica di Bense' and written by the artist Giovanni Anceschi (1939), a strong emphasis is placed on the theoretical meaning and function that Bense attributed to art. Anceschi specifies that this is a wide concept, which includes the relation between the object and the observer, research into the latter's way of perceiving, and the importance of programming in order to obtain a sense of restless innovation and variation of the artwork, with the aim of stimulating the observer's perception.[141] In fact, Bense offers an interesting definition of aesthetics, where he combines two different approaches – one rigorous and mathematic, one linked to the idea of novelty:

L'estetica, in quanto è una teoria, di fronte ai dati estetici della percezione estetica, sotto cui riassumiamo anche la rappresentazione mentale, assolve il suo duplice compito: introduce ordine e sistematicità nei dati della percezione estetica, ma rende anche possibili nuovi e penetranti modi di percezione delle opere d'arte.[142]

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[137] Margit Rosen, 'The art of programming: the new tendencies and the arrival of the computer as a means of artistic research', in *A little-know story about a movement, a magazine, and the computers arrival in art: new tendencies and bit international, 1961-1973*, pp. 27-41 (p. 27).

[138] Dorfles, 'Simbolo comunicazione consumo [1962]', in *Estetica senza dialettica: scritti dal 1933 al 2014*, pp. 747-943 (p. 778).

[139] 'In the place of the unique work of art, "projects" and work series appeared that were in part designated as "research examples". The research artist would establish connections with society and its living conditions'. See Rosen, 'The art of programming: the new tendencies and the arrival of the computer as a means of artistic research', p. 28.

[140] Max Bense, *Estetica*, ed. by Giovanni Anceschi (Milan: Bompiani, 1974).

[141] 'Questa evoluzione, che in primo luogo è di tipo teorico, consisteva nella constatazione che l'opera non è l'oggetto soltanto, ma anche il rapporto fra opera e spettatore, per cui invece di perseverare nello sforzo di produrre fenomeni oggettualmente irripetibili, si rivelava infinitamente più producente indagare sopra le capacità percettive del ricevente e programmare le immagini in modo da suscitare la 'parvenza' di una continua innovazione. Ecco anche qui una conferma, se ce ne fosse bisogno, della ripetuta affermazione di Bense che equipara l'arte a una attività teorica'. Bense, p. 9.

[142] Ibid., p. 43.

Once again, the idea of art as a dynamic, didactic and formative activity that must be rationalized in order to become performative and actively engaging is central. The aesthetic assignment is to restrain 'il consumo provocato dalla ricezione emotiva' of the artwork in favour of a wiser reaction, as Anceschi stated in his introduction.[143] This must be considered as the result of a scientific process, an attempt to investigate aesthetics rationally.[144] Anceschi seems to recall Dorfles's and Eco's theories, not only in reference to the didactic feature but also when he underscores the danger of a passive recipient for this kind of art experimentation, preferring, instead, the idea of an active observer who seeks to face the consumption of experimental art.[145]

One of the key topics Bense explored more deeply in his study is the notion of 'correality', or *realtà estetica* as translated by Anceschi (the original German term is *Mit-Realität*).[146] This is a complementary aspect of the artwork's physical reality and the area of interest which aesthetics affects. To be more precise, it is an abstract concept that reflects the real value of a work of art, which is not its physical form, but a combination of pieces of information that can be processed rationally in order to analyse the artwork from an innovative, aesthetic viewpoint. The information is provided by semiotic 'signs' that can be defined as 'unità di significato che non "sono" ma "significano" qualcosa', on which the observer's aesthetic perception is based.[147] 'Correality' is an interdisciplinary approach based on a method and on concepts drawn from information theory that define the artwork's fundamental way of being. We therefore pass from 'un'estetica dell'interpretazione' to '*un'estetica dell'osservazione*'.[148] Signs, in fact, can be defined as units with a semantic, syntactic and communicative value that shape 'correality' and that act in relation with each other as well as with the observers, for the identification of a significance for the artowork.

Beyond its physical reality, the work of art is expressed through the modality of 'correality': the set of signs, or semiotic units, that constitute the artwork make categories like the beautiful and the unpleasant irrelevant, while the genuine purpose of aesthetic judgment is to evaluate the level of perceptibility of these signs, how they are performed and communicated, and their connection with the observer.[149] The aesthetic value of a work of art is reduced to a pure, quantitatively computable

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[143] Ibid., p. 17.
[144] Ibid., p. 16.
[145] 'Alla ricezione passiva […] Bense contrappone […] la tensione intellettuale, la modificazione evolutiva necessaria alla ricezione dell'arte sperimentale'. Ibid., pp. 17-18.
[146] 'La nuova estetica è astratta in quanto si riferisce alla classe degli "oggetti estetici", si occupa cioè soltanto della descrizione numerica della loro specifica "realtà estetica"'. Ibid., pp. 28-29.
[147] Ibid., p. 72.
[148] Giangiorgio Pasqualotto, *Avanguardia e tecnologia: Walter Benjamin, Max Bense e i problemi dell'estetica tecnologica*, p. 32-33.
[149] Bense, p. 164.

describability, and the work is therefore approached with a technical conscience.[150] This concept of an artwork as a set of rational elements that constitute a whole, ready to be communicated to the observer, is well exemplified in this brief passage of *Aesthetica*, where Bense compares classical to modern aesthetics:

> Concludendo vorrei accennare ancora una volta al fatto che la differenza fra estetica classica ed estetica moderna consiste nella differenza fra concetto ontico e concetto semantico della bellezza. Nella estetica classica esiste il dato che è bello di per sé […]. Nella estetica moderna le cose diventano belle solo attraverso il segno che è stato trovato per esse attraverso il suono o il verso, attraverso l'immagine o la metafora, attraverso i ritmi, le metriche, o le prospettive; e ciò significa: nella estetica classica l'espressione "bello" (o "non bello") si riferisce a oggetti, ha cioè significato ontico; nell'estetica moderna e non-classica invece l'espressione si riferisce a segni e a sequenze di segni (di tipo matematico, categoriale, esplicativo e funzionale) e ha cioè significato semantico.[151]

The artwork is not beautiful as such, or based on irrational aesthetic judgments, but it can be rationally analysed, and the aesthetic judgment will only concern the way in which the work interacts and the function of each sign within the general structure.[152]

The notion of 'correality' introduces the idea of a rational and scientific aesthetics that can be compared to Moles's theories about the new role of the philosopher who collaborates with the artist towards the functional programming of the artwork. The observers and their direct experiences of the artwork – which Moles defines as an act of 'consuming' – can be interpreted as an intimate relationship that takes place in the field of 'correality', where information and signs directly interact with the observer. In fact, as Bense stated, 'non esiste nessuna rappresentazione del bello, esiste solo la sua produzione e la sua percezione'.[153]

Another key concept in Bense's theory of 'correality' is the idea that the artwork is an organized 'structure' of aggregated information.[154] Signs and information are tightly connected and they operate, as telecommunications do. This comparison enables Bense to clarify two aspects: the new concept of art as a real means of connection between the observer and the artist, and the influence of the technological environment of the 1960s on the definition of a new art theory. The aesthetic

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[150] Pasqualotto, p. 34.
[151] Bense, p. 202-3.
[152] 'Infatti un'idea a priori del bello non esiste, essa appare soltanto come realizzazione.' Ibid., p. 213.
[153] Ibid., p. 47.
[154] 'È noto che segni e informazione, semiotica e teoria dell'informazione, sono interconnesse. In tal senso è anche naturale in estetica passare dai problemi del segno ai problemi dell'informazione'. Ibid., p. 182.

object thus becomes pure information, that is to say a flux of communication.[155] This reflection inevitably leads us to consider the artwork in terms of a process, a dynamic event that can be conceived rationally, as theorized by Eco and Dorfles. In Bense's opinion, the aesthetic information must be investigated from the observer's viewpoint, taking into account the psychological, physiological and social functions of the artwork. The three dimensions of the sign, namely the syntactic one (relation with other signs), the semantic one (relation with significances) and the pragmatic/communicative one (relation with people and society), all refer to a functional type of art and recall the system of relationships that – according to Eco – enables the structuring of an *open work*.[156] Hence, the idea of the artwork as a connecting link extends and completes Eco's theory, as it gives the observer a crucial and active role in the characterization of the artwork.

By describing the structural nature of the artwork, Bense himself compared it with the subatomic structure of an atom and emphasised its entirety.[157] The concept of 'structure' can, then, be linked to different aspects of my research: Eco's concepts, read through the lens of Bense's theory, shed light on the productive, active and intrinsic relationship between the artist, the physical evidence of the work of art, the aesthetic idea of 'correality', and the observer. Furthermore, the idea of 'un sistema di relazioni' renews the idea of art as a form of communication, a concept particularly emphasised by Dorfles in his attempt to theorize a type of art that can actively relate to the observer. The structural model of the *open work* as theorized by Eco (see Chapter 1, section 1.2) is therefore comparable to the concept of 'correality'. In both cases we focus on the artwork's way of being, on its creating the basis for a subsequent *open* relationship with the observer.

The last concept that requires attention is Bense's belief in the function of art within the general process of civilization: art should have a vital role in intellectual and social innovation, stimulating the observer's critical participation. From a different point of view, this concept can definitely also be traced in Eco's and Dorfles's theories, and it can be linked to the tendency in those years to study the didactic role of art through exhibitions and interdisciplinary installations (see Chapter 1, section 1.1.2). This tendency aimed to avoid the fetishization of the artwork, or a passive inclination to it, as Eco, Dorfles and Moles had also observed. In Bense's opinion, artistic

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[155] 'Il processo estetico è stato concepito come una sorta di processo antagonista di quello fisico, e in questa prospettiva esso non rappresentava null'altro che un processo informazionale'. Ibid., p. 301.

[156] Ibid., p. 205.

[157] Ibid., p. 208. In his book *Avanguardia e tecnologia. Walter Benjamin, Max Bense e i problemi dell'estetica tecnologica*, philosopher Giangiorgio Pasqualotto accurately describes the relationship between the concept of 'structure' in art and the relative influence of the surrounding scientific environment: 'Il parallelo così instaurato tra fisica moderna ed estetica moderna si consolida maggiormente non appena ci si sposti sul terreno occupato dal concetto di "struttura". Allora si può scoprire che come il fisico moderno tratta delle particelle infinitesimali non alla luce dei concetti di relazionalità e di totalità, così nella pittura e nella scultura moderne si tratta dell'essere estetico di un'opera non entro gli schemi di una datità (Gegebenheit) irrelazionata, ma entro la prospettiva delineata da quelli che vengono definiti i momenti strutturali di una serie (Strukturmomenten einer Serie)'. See Giangiorgio Pasqualotto, *Avanguardia e tecnologia: Walter Benjamin, Max Bense e i problemi dell'estetica tecnologica*, p. 32.

communication through the use of a functional aesthetics is a symbol of intellectual and social dynamism that reduces the risk of automatization.[158] Art can therefore be defined as a *concept-in-becoming*,[159] since – as Bense stated – 'l'arte […] produce informazione e comunicazione che sono espressioni di dinamica e innovazione'.[160]

In sum, Moles's and Bense's theories answer to an urgent need for a common and formative aesthetic appreciation that, because of the evolution of mass media, theorists and critics considered urgent in their search for a new and modern function of of art.

1.5 The Influence of Cybernetics: an Example of an Interdisciplinary Approach

In order to analyse the development of the Arte Programmata movement, it is fundamental to have the right tools to comprehend the complex and multidisciplinary, cultural context of the 1960s in Italy. In this section I will discuss the role played by cybernetics, a paramount aspect of this decade. Cybernetics can be defined as a subject with countless applications in a wide range of disciplines. Its interdisciplinary character is evident from its definition given by the Indian writer Jagjit Singh, in his work *Great Ideas in Information Theory, Language and Cybernetics* (1966). For Singh, cybernetics is an interdisciplinary research area that studies nature and the physical bases of human intelligence with the precise aim to reproduce it artificially.[161] More specifically, cybernetics can be defined as 'una scienza applicata che mira a riprodurre le operazioni del cervello umano in complessi meccanici od elettronici'.[162]

Since the end of the 1950s, the city of Milan had been at the forefront of the study of this discipline, thanks to the research led by Ceccato at the Centro di Cibernetica e di Attività Linguistiche of the University of Milan. Ceccato's research purpose becomes clear from his offprint 'Suggestion for Anthropology: the Machine which Observes and Describes', where the scientist expresses his intention to convert philosophy, linguistics, psychology, physiology, anatomy, mathematics, physics,

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[158] Bense, p. 380.
[159] Eco chose to use the term 'becoming' [*in divenire*] to define Arte Programmata works and, more in general, a type of artistic expression, in the English version of the text prepared for the exhibition catalogue 'Arte cinetica. Arte programmata. Opere moltiplicate. Opera aperta' of 1962. Here he underlined the importance for the new generation of artists to accustom people to new "becoming forms": 'that forms are not something immobile that awaits to be seen, but also something 'becoming' while we watch it'. See *Arte cinetica. Arte programmata. Opere moltiplicate. Opera aperta*, (Milan: Officine d'arte grafica A. Lucini, 1962), exhibition catalogue.
[160] Bense, p. 380.
[161] Jagjit Singh, *Great Ideas in Information Theory, Language and Cybernetics* (New York: Dover publications, 1966), pp. 5-7.
[162] Silvio Ceccato, *Cibernetica per tutti*, ed. by Giampaolo Barosso, 3rd edn (Milan: Feltrinelli Editore, 1975), p. 11.

chemistry and engineering into applied disciplines.[163] The importance placed on the word 'applied', which Bense used to define the nature of aesthetics, reflects his desire to conceive human knowledge as practical, democratized, rational and – most of all – functional.[164] Ceccato's idea that 'tutto il "pensiero" è tecnica' accurately summarizes this concept.[165] The idea of functional arts – which I mentioned in the discussion of the social environment and principal exhibitions that characterised the first half of the 1960s as well as in my analysis of the theorists' point of view – is strictly connected to the aim to popularize culture, although it simultaneously stresses an increasingly evident didactic purpose. With regard to cybernetics, valid examples of this educational objective include the presence of Ceccato's articles about cybernetic theories in the newspaper *Il Giorno*, published between 1964 and 1967, as well as the entry for 'Cibernetica' in the Dizionario Garzanti della Lingua Italiana in the same period.[166]

From the beginning of his research at the Centro di Cibernetica e di Attività Linguistiche, Ceccato distinguished himself for his desire to involve different specialists in his experiments with the mechanization and reproduction of human activities, among which the capacity of the human body to observe and describe an object. In his book *La fabbrica del bello*, he describes his interdisciplinary approach by stressing the necessity to work with physiologists, psychologists and artists in order to jointly investigate the biological characteristics of humans, as well as the attitude and the ability to illustrate figures so as to be able to replicate them mechanically.[167] Ceccato illustrates his collaboration with Gruppo V and, in particular, with the artist and teacher Pino Parini (1924) – for a study of the different operations that constitute the human activity of figuration – in the chapter 'Gli artisti collaborano'.[168] For the purpose of this introduction about cybernetics, it is worth recalling the truly interdisciplinary collaboration that took place in the 1960s between Ceccato, Parini and Fontana (fig. 9 and 10): Fontana was heavily involved in Ceccato's preparations for a

[163] Silvio Ceccato, 'Suggestion for Anthropology: the machine which observes and describes' offprint from *The use of computer in Anthropology*, ed. by Dell Hymes (London: Mouton & Co., 1965), pp. 493-4.
[164] The artist Anceschi, in his introduction to Bense's book *Aesthetica*, describes the philosopher's tendency to consider aesthetics as a type of 'arte applicata' itself, and then functional: 'A ciò si lega poi un intendere l'estetica nuova, l'estetica della 'constatazione', […] l'estetica, come una sorta di *arte applicata*, e non certo l'arte come l'applicazione di una (o della) teoria estetica'. Bense, p. 6. It is evident that Ceccato and the philosopher share the same approach to knowledge disciplines, which they consider as practically usable.
[165] Angiolo Maros Dell'Oro, *Il pensiero scientifico in Italia (negli anni 1930-1960)* (Cremona: Gianni Mangiarotti Editore, 1963), p. 94.
[166] Ceccato, *Cibernetica per tutti*, p. 5 and p.11. Even the title of the book reflects what I have already demonstrated: the desire of many scientists for a more democratic spread of knowledge.
[167] Silvio Ceccato, *La fabbrica del bello: L'estetica per tutti o per pochi* (Milan: Rizzoli, 1987), p. 75.
[168] Ibid., pp. 123-129. Gruppo V was a group of artists from Rimini, which collaborated with Ceccato's centre in Milan. They were coordinated by the artist and schoolteacher Parini. Thanks to their collaboration with Ceccato, they focused their studies on human perception, trying to integrate – from an artistic point of view – research with the reproduction of human activities, such as observing and describing. They took part in different exhibitions along with Arte Programmata groups (with whom they shared a tendency to anonymity and group unity), such as 'Strutture di Visione' in Avezzano, in 1964, and 'nova tendencija 3', a year later. See *53/85 Ricerche artistiche a Rimini nel secondo Novecento*, ed. by Simonetta Nicolini and Renzo Semprini (Misano Adriatico: Silver Books, 1998), p. 26.

mechanical experiment called 'macchina che osserva e descrive'.[169] This commitment is described in the documentary *La fabbrica della mente*, recorded in Fontana's studio by Swiss Television, where Parini, Ceccato and Fontana all took part in the assemblage of the first part of Ceccato's machine, the *Visore*.[170] More specifically, the experiments conducted by this interdisciplinary group of researchers focused on human attention, spatial orientation and on activities such as assembling, categorizing, interpreting and describing. The close collaboration between Ceccato and Fontana, as well as the similarities between Arte Programmata artists and cybernetics – as I will explain below – with regard to the functioning of human optic perception, are all valid reasons to consider Ceccato's work a fundamental source of inspiration for programming theories.[171] Fontana is indeed considered one of the most important inspirations for programmed artists, because of his studies on Spatialism and his experiments with the medium of television and new materials (see Chapter 2, section 2.1.2).

Ceccato, in *La fabbrica della mente*, stresses the importance of an artistic collaboration that could lead 'lo scienziato e l'artista ad avvicinarsi con un intento di comprensione e di scoperta assolutamente nuovi'.[172] This is a clear acknowledgement of the remarkable interdisciplinary approach of the culture of the time in the study and analysis of human nature. The relationship between cyberneticists and artists, conducted by Ceccato's Cybernetics Centre, summarizes the tendency of this period towards beneficial interactions between arts and science, the focus on human observation and the relative attention paid to the observer's role in the aesthetic process. The British psychologist Michael J. Apter (1939), in his 1969 article 'Cybernetics and Art',[173] highlights two important concepts that strengthen Ceccato's concept: according to Apter, cybernetics is characterized by a 'synthesizing attitude' rather than by an innovation in terms of content, and it represents a development in science which holds out the promise to take art seriously'.[174]

This rationalization and functionalism of the arts, largely influenced by the developing technological society of the 1960s, led Ceccato to introduce the pioneering concept of a 'new Humanism', where the attention on the human being was filtered by the presence of the machine.[175] Apter's following statement explains the choice of this term: '[…] Cybernetics is not so much reducing man to the level of "machines" […] as elevating machines to the level of man'.[176] According

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[169] Ceccato, 'Suggestion for Anthropology: the machine which observes and describes' offprint from *The use of computer in Anthropology*, pp. 479-90.

[170] More information about this collaboration can be found in: Gianni Roghi, 'La matita e la mente', *L'Europeo*, 30 (1964), 60-65.

[171] *53/85 Ricerche artistiche a Rimini nel secondo Novecento*, p. 24.

[172] Ceccato, *La fabbrica del bello: L'estetica per tutti o per pochi*, p.123.

[173] Michael J. Apter, 'Cybernetics and Art', *Leonardo*, 3 (1969), 257-265.

[174] Ibid., pp. 257-265 (p. 257, p. 264).

[175] '[…] Questo è forse il maggiore contributo che sul piano teorico la cibernetica offre alla scienza, compiendo insieme un importante passo verso la formazione di un nuovo umanesimo'. Ceccato, *La fabbrica del bello: L'estetica per tutti o per pochi*, p. 77-78.

[176] Apter, pp. 257-265 (p. 261).

to Apter, the importance placed on the role of human beings in determining their relationship with the social context and machines gives birth to a new interest in feedback processes: cybernetics, in his words, can be extremely relevant for an investigation of 'interacting emotional and intellectual processes in the nervous system of the spectators themselves.'[177] The human being, as defined in Eco's *Opera aperta* and *Apocalittici e integrati* as well as in Dorfles's works, demonstrates how the cultural and social environments – as well as industrial progress – lead the modern consumer to demand participation, integration and interactivity, especially in cultural experiences. From Ceccato's viewpoint, however, 'pensiero ed esperienza non sono altro che tecniche'; people's participation is, then, only a scientific factor, that is to say, an activity strictly related to the human being's biological functions.[178] These reflections led him to focus his subsequent studies on the reproduction of the operations of the human brain with the help of mechanical models and machines.

This academic tendency to concentrate on the components rather than on a 'whole' united scholars from different yet close fields. In Bense's aesthetics, the work of art is defined as a structure, a combination of information – in his case, semiotic signs – that can be processed rationally. Eco himself focused on the components of an *open* artistic object, describing it as characterized by a 'structure', that is, a system of semantic, syntactic, emotional and physical relations.[179] As with the artwork, Ceccato considered the human mind as a structure or, more precisely, as a combination of activities. In the magazine *Marcatrè*, he underlined his proximity to a philosophical approach as follows:

Nel corso del mio vagabondare fra le filosofie e le scienze un giorno mi sembrò di intravvedere qualcosa di nuovo, e proprio mentre lavoravo 'di fresco'. Si trattava della *parte* e del *tutto* […] Il costruttore di un modello della mente ha bisogno di ben altro: precisamente, ha bisogno di ridurre ogni cosa, per intenderci già tutto ciò che nominiamo con le singole parole di una lingua e con le combinazioni di queste, ad operazioni.[180]

Focusing more on the relationship between cybernetics and art, Apter saw in this discipline a means of making 'a rapprochement between science and art' possible, whereas Ceccato stressed the importance of a new approach in the artists' search for new expressive media.[181] Artists, in Ceccato's opinion, should be aware of the complexity of human thought processes and, most of all, of human

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[177] Ibid., pp. 257-265 (p. 262).
[178] Angiolo Maros dell'Oro, p. 106.
[179] Eco, *Opera aperta. Forma e indeterminazione nelle poetiche contemporanee*, p. 21.
[180] Silvio Ceccato, Aldo Masullo, Bruno Lauretano, 'Metodo della filosofia', *Marcatrè*, 23-25 (1966), 149-160 (pp. 150-151).
[181] Apter, pp. 257-265 (p. 264).

multitasking abilities in the 1960s. This comprehension of human nature would favour a greater effectiveness of the artists' works, putting them in closer contact with the observer:

> Una consapevolezza operativa dei processi di pensiero e di linguaggio, del loro rapporto, degli atteggiamenti cui varie modalità dell'operare mentale danno luogo, etc., può rappresentare un valido aiuto per l'artista nell'elaborazione dei mezzi espressivi di cui dispone o nel tentativo di crearne di nuovi […] Se certe attività appaiono ben distinte, questo avviene più in risposta ad un nostro bisogno di analisi e di ordine, che non perché nella vita di ogni giorno ci si trinceri dentro l'una o dentro l'altra.[182]

The relationship between the artist and the observer reflects the importance of the observer's feedback, which Apter developed in his article. Apter himself listed several applications of cybernetics in artistic disciplines and a number of ways in which cybernetics could have influenced artists. It is worth citing three applications of this discipline in the art field: firstly, the idea of the machine as a work of art; secondly, the idea of cybernetics as art itself; and thirdly, the conceptualization of art as a process. Cybernetics, in Apter's opinion, plays an avant-garde role in the breaking down of:

> The widespread feeling that there is some necessary antagonism between art and machinery […] it is conceivable that the negative connotations towards machinery might have been so great that, for example, kinetic art would have taken longer to develop.[183]

Apter's words underline the certainty that the broad value of cybernetics was an essential driving force behind the pioneering artistic expressions of this period, and he cites the case of kinetic art (of which Arte Programmata is a direct offspring) as an example. Concerning the second usage of cybernetics, Apter stated that it truly embodies the new developing concept of machinery aesthetics: some mechanical models produced by researchers may certainly have aesthetic features alongside their scientific purposes.[184] They represent, then, the perfect match between a modern and rational concept of aesthetics and scientific functionalism. Even though it was not presented as a cybernetic model at the Turin exhibition, the electrified model of a human brain that Burtin created can be considered a precursor of cybernetics as a form of art. Thanks to its shapes and interactive features it

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[182] Ceccato, *Cibernetica per tutti*, p. 147.
[183] Apter, pp. 257-265 (p. 264).
[184] 'Cybernetics appears to generate art even in its pure science aspects. It produces, especially through the process of model building, entities which often seem to possess aesthetic as well as scientific value'. Apter, pp. 257-265 (p. 265).

can be considered a form of art, while its functional role is to educate the viewer about the mode of operation of brain synapses. This interpretation of cybernetic mechanical models as artistic expressions is essential to reinforce the theory of the general influence of 1960s industrial progress on aesthetic research of the period. This tendency, as we will see in my analysis of the Arte Programmata movement, inevitably led to the birth of new concepts of beauty and a new industrial taste in the aesthetic field, which unites the canonical elements of artistic expression and more scientific, technical features derived from the aesthetics of machinery.[185] Lastly, in Apter's view, cybernetics helps to conceive art as a process, as something in constant evolution:

> The emphasis of Cybernetics on process and change may have been one of the factors generating an increasing feeling among artists that art should be regarded as a process rather than as the production of static objects. This feeling has manifested itself in a number of ways, including the production of works of art which are impermanent, the advent of the 'happening' as an art form and the deliberate and creative utilization in some works of kinetic art of the participation of the spectator, i.e. of feedback between the spectator and the work of art.[186]

The idea of art as a process can easily be linked to Eco's theory of the *open work*, where the artwork is considered an evolving concept that changes meaning according to the individual observer's experience. In Eco's opinion, every artistic consumption is different, and every artistic object has multiple perceptual points of view.[187] Furthermore, the model of art as a sequence of operations is a democratic and rational concept that inevitably implies – as Apter observed – a crucial role of the observers and their engagement; it recalls Moles's and Dorfles's theories of the role of the aesthetician as a laboratory-based social scientist and the role of art as a form of communication, respectively.

Conclusion

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[185] 'Parallelamente a ciò si sviluppa il processo dell'aumento delle probabilità di collegamento fra campi spirituali diversi, fra ambiti apparentemente estranei gli uni agli altri [...] Siamo autorizzati dunque, ad aggiungere il concetto di bello tecnico, a completamento di classici concetti di bello artistico e di bello naturale'. Bense, pp. 52-53.

[186] Apter, pp. 257-265 (p. 265).

[187] Eco seemed to reach the same conclusions as those theorized by cyberneticists, when he wrote about the resemblance of the multiple consumptions of an artistic object with the latest scientific discoveries: 'Per cui non sarà azzardato ritrovare nella poetica dell'opera "aperta" (e più ancora dell'*opera in movimento*), dell'opera che ad ogni fruizione non risulta mai uguale a sé stessa, le risonanze o precise di alcune tendenze della scienza contemporanea'. Eco, *Opera aperta. Forma e indeterminazione nelle poetiche contemporanee*, p. 51.

To conclude, this extended contextual analysis has revealed the fact that 'the artistic object needs a public'.[188] This citation perfectly summarizes what I have described in this chapter, that is, the definition of the concept of 'aesthetic object' and the importance of the observer's engagement for the definition of the artwork itself. Thanks to the observer and their aesthetic perception, it is possible to reveal the real aesthetic characteristics of the artwork or, in Bense's words, its 'correality'.[189] What emerges – as Dorfles reaffirmed during a debate on the role of semantic painting that was published in *Marcatrè* – is the closeness between art and the act of communicating. In fact, both are characterized by signs that convey a message. Art is therefore a form of communication based on semiotics.[190] The new typology of observer/consumer that emerged from research conducted by artists, critics and scientists was characterized by a new attitude: the observer's desire to be entertained, involved and stimulated. This tendency was rooted in the new urban environment, enriched by perceptual and multisensory stimuli, as well as in the mass media popularization of different disciplines such as science and art. Cybernetics followed this trend by focusing on the study of the human being through the use of machines, and tried to explain the importance of interdisciplinary studies for a greater awareness of science, art and the functioning of human nature from an innovative viewpoint. The themes that I have discussed in this chapter – such as the importance of perception, the idea of an artwork as a totality derived from its different constitutive elements, and the desire for a relationship with an active and aware observer – are all crucial elements to better frame the development of Arte Programmata.

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[188] Mikel Dufrenne, *Fenomenologia dell'esperienza estetica* (Rome: Lerici, 1968), p. 99.
[189] Ibid., 105.
[190] 'Dibattiti: Pittura semantica', *Marcatrè*, 26-29 (1966), 363-367 (p. 363).

Chapter 2: The Story of a Movement: Precursors, Programmatic Texts, Groups and Principal Exhibitions

The purpose of this second chapter is to identify the specific features of the Italian Arte Programmata movement, focusing on its two principal groups, respectively called N and T. I will pay particular attention to Gruppo T's activity; the time span taken into consideration covers the beginning of its artistic investigation as a kinetic and avant-garde group in 1959 and the 1964–1965 period, when its exhibiting activity as a group gradually finished. The chapter will also discuss the influence on the movement of Eco and of Bruno Munari (1907–1998), both responsible for the specific definition of the term 'programmazione' given in this context and for the establishment and theorization of the Arte Programmata movement.

I will study the evolution of these groups through an analysis of different factors, in order to comprehend the birth, development and end of this short yet cutting-edge, collective artistic season. An analysis of programmatic texts and public statements by Arte Programmata groups as well as an investigation into the lives of artists who were very close to Gruppo T and Gruppo N will prove essential features to frame the nature and cultural roots of this movement, which some critics have defined as the last Italian avant-garde.[191]

I will explore in detail the development of Gruppo T's series of exhibitions called 'Miriorama', as well as its presence at different international shows. This will enable me to describe the evolution of the idea of Arte Programmata and the relative aesthetic offer proposed to the public in that period. The decision to pay more attention to Gruppo T's works and creative theories derives from the desire to focus on experiments that mainly involved a real, not illusory kinetics, which resulted in the consequent physical and sensorial involvement of the observer, while Gruppo N was characterized more by an apparent kinetics that took advantage of optical illusions. Furthermore, I have decided to rely on a set of texts written for the 'Miriorama' series of exhibitions that represent a very valid tool to investigate the rapid development of the idea of programming. The research on the idea of programming will be responsible for the stylistic peculiarities of this movement, which were officially theorized and formalized during the famous Milanese exhibition at the Olivetti showroom in 1962.

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[191] In the catalogue edited by Lea Vergine (1938–2020), *Arte programmata e cinetica (1953-1963): L'ultima avanguardia*, the Italian critic describes the artistic experiments conducted under the definition of New Tendencies as the last avant-garde of modern art history. See *Arte programmata e cinetica (1953-1963). L'ultima avanguardia*, ed. by Lea Vergine, p. 12.

The public will therefore be the main focus of this chapter where, through a careful analysis of textual sources and pieces of art, I will highlight how the emerging attention to the observers' involvement was decisive in theorizing a new concept of art that nonetheless had to contend with the doubts of critics, political commitment, the contemptuous rules of the art market, and the problems associated with a new idea of group work.

2.1 The Origins: Gruppo N, 'Miriorama 1' and the Importance of Inspiring Precursors

2.1.1 Gruppo N's and Gruppo T's First Programmatic Statements and Stylistic Differences

The Arte Programmata movement is quite difficult to frame from both a chronological and ideological point of view, because the artistic activity of the two pioneering groups – Gruppo T from Milan and Gruppo N from Padua – was characterised by substantial differences in the interpretation of the concept of programming and motion. Additionally, the artists of both groups started experimenting at least two years before Munari's and Eco's formal theorization of Arte Programmata – between 1961 and 1962 – and its ratification following the seminal exhibition 'Arte Programmata' at the Olivetti showroom in Milan.

Although a number of magazines and periodicals focused the readers' attention on the novelties generated by this artistic research, the most effective display of this phenomenon can be found in issues 12 and 22 of the journal *il Verri*, published in 1963 and 1966 respectively. I will mainly draw on these two special editions for my discussion and reflections on Arte Programmata, both in this chapter and in the following ones. Founded by the literary critic Luciano Anceschi, *il Verri* (1956–1995) was one of the most significant literary journals of the second half of the twentieth century. It had a strong multidisciplinary imprint and was the main reference point – especially in the 1960s and 1970s – of the so-called second Italian literary avant-garde, in particular Gruppo 63 and neo-avant-garde personalities such as Nanni Balestrini, Edoardo Sanguineti and Renato Barilli.

The 1963 special issue *Dopo l'Informale* deal with the problematic artistic production of the time, when a general redefinition of aesthetic values went hand in hand with a rearrangement of the ethical and social dynamics of that period. In particular, *Dopo l'Informale* focused on the end of the Informale movement and the relative values attributed to concepts such as 'materia' and 'segno' – aesthetic symbols of the artists' political and social commitment, and of their individual and subjective expressiveness. The 1963 special issue also addressed the recent artistic interest in group activities as well as the growing relevance of technical and industrial, aesthetic phenomena and

products.[192] Furthermore, the issue presented a contribution written by the prominent art critic Enrico Crispolti (1933–2018), 'Neoconcretismo, Arte Programmata, lavoro di gruppo', which I will regularly cite given its relevance for this subject. The article aptly described the different European influences that contributed to the development of Arte Programmata groups at the beginning of the 1960s and also illustrated the nature and poetics of Gruppo T and Gruppo N, the potential of their innovative artistic theory, the limits of their production, the possible future development of their ideas, and their connections with the critics who decided to support these artists.[193]

The second special issue of the journal that I have taken into consideration for this study is issue 22 of 1966, entirely edited by Dorfles and entitled *L'Arte Programmata*. It contained contributions by Dorfles himself, by Bense and by the critic Filiberto Menna (1926–1988), as well as programmatic statements by various artists of Gruppo T. The principal aim of this issue was, then, to present the critical, historical, psychological and aesthetic aspects of the artistic movement under examination with the help of contributions from its most prominent key players.[194]

Gruppo T, the more enduring of the two groups, was founded in Milan in 1959; Gruppo N, from Padua, found its stability only at the end of 1960.[195] Menna perfectly summarizes the difference between these two realities:

Gli artisti padovani […] Si sono occupati fin dall'inizio di fenomeni percettivi legati soprattutto alla psicologia della forma insistendo in maniera particolare sull'aspetto sperimentale della ricerca e con preoccupazioni di ordine plastico meno pressanti rispetto ad altri artisti cinevisuali, e impegnandosi in un lavoro di collaborazione diretta anche con studiosi di psicologia sperimentale.[196]

In 1960 members of Gruppo N,[197] while testing their innovative kinetic provocations, took part in the collective displays organized by Piero Manzoni (1933–1963) at the Azimut gallery, in collaboration with the German opto-kinetic group Zero. They also planned pioneering events such as the exhibition 'La nuova concezione artistica' at the Circolo del Pozzetto in Padua (see Chapter 3). On these occasions, Gruppo N's members dialogued with artists who, at that time, were involved in a radical renewal of the concept of surface, painting and interaction in Europe. Nevertheless, between 1960

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[192] Maurizio Calvesi, 'Ridimensionamento dei valori', *il Verri*, 12 (1963), 7-11 (p. 10).
[193] Enrico Crispolti, 'Neoconcretismo, arta programmata, lavoro di gruppo', *il Verri*, 12 (1963), 20-67.
[194] Gillo Dorfles, 'Preambolo all'arte programmata', *il Verri*, 22 (1966), 3-8, (p. 6).
[195] *Arte Programmata e Cinetica in Italia 1958-1968*, ed. by Marco Meneguzzo (Parma: Galleria d'Arte Niccoli, 2000), p. 194.
[196] Filiberto Menna, 'Situazione delle esperienze cinetiche e visuali in Italia', *il Verri*, 22 (1966), 104-114 (p. 112).
[197] Members of Gruppo N included Alberto Biasi (1937–), Ennio Chiggio (1938–2020), Toni Costa (1935–2013), Edoardo Landi (1937–) e Manfredo Massironi (1937–2011).

and 1961, Gruppo N still dedicated itself to purely Dadaist provocations. To be precise, two exhibitions underlined this Dadaist drift: 'Nessuno è invitato a intervenire', held in Gruppo N's studio in Padua from 11 to 13 December 1960, and 'La Mostra del Pane', held in the same studio on 18 March 1961. If, in the first case, the provocation consisted in presenting and promoting the inauguration of an exhibition that no one was allowed to enter, in the second case observers were invited to appreciate 'forme commestibili' of bread without seeking any intrinsic meaning or social value in them; they simply had to appreciate the different loaves that adorned the environment.[198] However, the first kinetic provocations conducted by Gruppo N reveal that the Paduan group's research focused on a virtual and illusory movement of the work of art. In a letter to Munari regarding the organization of the first collective 'Arte Programmata' exhibition, Gruppo N clearly expressed the specific aim that it pursued through its research: 'Per la maggior parte dei nostri lavori sarà da precisare che il programmatore dell'opera è lo stesso spettatore che sceglie una visuale piuttosto che un'altra oppure ne determina delle variazioni indeterminabili cogliendo l'oggetto nel movimento della sua visuale'.[199]

By contrast, Gruppo T aimed to develop and study the actual movement of the work of art, focusing on its three-dimensional shape: the observer's interaction is not only perceptual, but also linked to the senses.[200] Crispolti, in the aforementioned article 'Neoconcretismo, Arte Programmata, lavoro di gruppo', underscores how the Paduan group was characterized by a 'rigorismo costruttivista' that distinguished it from the Milanese group. In Crispolti's opinion, Gruppo N was in search of a way to control the variability of reality, whereas Gruppo T tried to emulate its changeability and instability.[201]It is highly plausible that the inspiring and multidisciplinary environment of Milan played a crucial role in the development of the peculiarities of Gruppo T's style. Generally, both groups embodied the philosophy of collective work, even though it is possible to distinguish specific personalities, styles and typologies of research within the two groups. As Crispolti observed, the groups were characterized by '"scoperte individuali", che hanno un margine notevole di discussione comune'.[202]

The activity of the young members of the future Gruppo T – Anceschi, Davide Boriani (1936–), Gianni Colombo (1937–1993), Gabriele Devecchi (1938–2011) and Grazia Varisco (1937–) –

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[198] See *Alberto Biasi: opere dal 1959 2013*, ed. by Marco Meneguzzo (Lugano, Galleria Ravizza, 2013), pp. 10-11 and pp. 24-33.
[199] *Programmare l'arte: Olivetti e le neoavanguardie cinetiche*, ed. by Marco Meneguzzo, Enrico Morteo, Alberto Saibene (Monza: Johan & Levi Editore, 2012), p. 15.
[200] *Davide Boriani: Arte cinetica, programmata, interattiva*, ed. by Lucilla Meloni (Imola: Manfredi Edizioni, 2018), p. 52.
[201] Crispolti, pp. 20-67 (p. 45).
[202] Ibid., p. 63.

started with an important collaboration with the Galleria Pater in Milan, in September 1959.[203] Crispolti saw great innovative potential in their monochromatic works, despite these still being characterized by the prevalent Informale style and, at the same time, influenced by the canvas experiments that were typical of the 'Pittura-Oggetto' tendency, whose major representatives in those same years were Manzoni, Agostino Bonalumi (1935–2013) and Enrico Castellani (1930–2017).[204] Prior to the avant-garde statement of 15th October 1959 where Gruppo T announced its foundation and the preparation of its first exhibition, 'Miriorama 1',[205] Crispolti – commenting one of their monochromes exhibition in the October issue of *il Verri* magazine – seems to have anticipated the general guidelines of Gruppo T's future, innovative concept of art.[206] Crispolti identified the need for a new function of the artwork – closer to the evolution of modern society – that seemed to emerge from the group's extrovert monochrome paintings (fig. 11). Expressions such as 'rinnovamento dei media espressivi', 'coincidenza spazio-temporale' and 'aderenza alla concreta situazione dell'uomo', which the critic used to describe this production that seemed to evolve from the classic idea of 'pittoricismo', focus the reader's attention on the new artistic directives of the 1960s, when the interest in artistic communication had to merge with the concepts of space and time within the artwork itself.

It is precisely the relationship between space and time that is at the heart of Gruppo T's first official statement, called 'Miriorama 1. Manifestazione del gruppo T'. Here the artists define the reality around them as a union of these two physical variables and offer, precisely, a continuously different way of perceiving the space–time relationship. As a consequence, the world can be described only as a constant flux of events and phenomena: 'Ogni aspetto della realtà, colore, forma, luce, spazi geometrici e tempo astronomico, è l'aspetto diverso del darsi dello SPAZIO-TEMPO o meglio: modi diversi di percepire il relazionarsi fra SPAZIO e TEMPO'.[207] Introducing an epistemological comparison between the work of art and reality, Gruppo T declared the impossibility of defining an

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[203] Even though she was present in Gruppo T's exhibition experiences from the beginning, Varisco did not officially ratify her role in the group until the 'Miriorama 6' exhibition, hosted by the Galleria Pater in March 1960.

[204] The term 'Pittura-Oggetto', conceived by Dorfles in 1966, refers to an artistic tendency developed in Milan between the second half of the 1950s and the first half of the 1960s. Its principal exponents were Bonalumi, Fontana, Castellani, Paolo Scheggi, Dadamaino and Manzoni. The first official exhibition dedicated to 'pittura-oggetto' was 'Pittura – oggetto a Milano: Fontana, Bonalumi, Castellani, Scheggi', hosted in 1966 by the Studio d'Arte Arco d'Alibert in Rome. In general, the artists create these artworks by using the canvas as a medium; in this way they create three-dimensional elements and extrusions that reshape and alter the artwork's bi-dimensionality.

[205] The statement, subscribed by Anceschi, Boriani, Colombo and Devecchi as the foundation of Gruppo T (15 October 1959), was also published as an invitation to the exhibition 'Miriorama 1', organized at the Galleria Pater on 15 January 1960. The term 'Miriorama' comes from Greek and means 'endless visions'. See *Davide Boriani: Arte cinetica, programmata, interattiva*, p. 50.

[206] Enrico Crispolti, 'Mostra di Anceschi, Boriani, Colombo, Devecchi. Gall. Pater, Milano, settembre 1959', *il Verri*, 5 (1959), 98.

[207] *Gruppo T: Miriorama, le opere, i documenti* (Bologna: P420 Arte Contemporanea, 2010), p. 27.

artwork if not as something dynamic, in constant change precisely because the reality in which people live is by no means static and immutable:

> Da quando una realtà intesa in questi termini ha preso il posto, nella coscienza dell'uomo (o solamente nella sua intuizione) di una realtà fissa e immutabile, noi ravvisiamo nelle arti una tendenza ad esprimere la realtà nei suoi termini di divenire. Quindi considerando l'opera come una realtà fatta con gli stessi elementi che costituiscono quella realtà che ci circonda è necessario che l'opera stessa sia in continua variazione.[208]

The idea of an artwork as a *concept-in-becoming* inevitably implies a strong connection between this artistic conception and Eco's *open work* theory. The group's members and the critics analysed so far shared the idea of an *open* and dynamic artwork that represents an epistemological model of the society in which it is developed.

Comparing Gruppo T's programmatic text with that written by Gruppo N, it is crucial to highlight a number of similarities and differences.[209] The latter text, published on the occasion of the XXII edition of the artistic Premio Lissone prize in 1961, described the group members as 'disegnatori sperimentali': this demonstrates, as for Gruppo T, their effort to break the aesthetic canon in favour of a speculative and rational investigation of reality. Moreover, the text underscored the importance of a collective and anonymous way of working that recognises Gruppo N's affinity – more than with its Milanese counterpart – with political and social issues. Like Gruppo T, it stressed the impossibility of framing its works in any specific category such as painting or sculpture, but it considered the machine as a brand-new way of expressing art with an interdisciplinary approach. Compared to Gruppo T's programme, this declaration does not convey any particular curiosity about or interest in the idea of movement or fluidity, nor does it contain any other words that could be related to this idea, such as 'variazione' or 'divenire'. This absence could be seen as proof of the Paduan group's diverse approach to kinetics that will emerge from its works.

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[208] Ibid.

[209] Gruppo N's declaration reads as follows: 'La dicitura "enne" distingue un gruppo di "disegnatori sperimentali" uniti dall'esigenza di ricercare collettivamente. Essi sanno (forse) da dove derivano; ignorano dove stanno andando. I loro oggetti studi e quadri nascono da esperienze difficilmente catalogabili, perché al di fuori di ogni "tendenza artistica". Sono certi (?): che il razionalismo e il tachismo sono finiti, ma che sono stati necessari; che l'informale e ogni espressionismo sono inutili soggettivismi. Riconoscono nelle nuove materie e nella macchina i mezzi espressivi della "nuova arte" in cui non possono esistere separazioni fra architettura, pittura, scultura e prodotto industriale. Negano le dimensioni spaziali e temporali in cui l'uomo è vissuto fino ad oggi deterministicamente. Ricercano nell'indeterminazione degli interfenomeni l'oggettività necessaria a concretizzare lucespaziotempo. Rifiutano l'individuo come elemento determinante della storia dell'esperienza della fattività e ogni perfezione che non nasca da un innocuo bisogno di "regolarità". Rifiutano ogni feticismo religioso-morale-politico. Difendono un'etica di vita collettiva. (?)'. See *Arte Programmata e Cinetica in Italia 1958-1968*, p. 189.

The intention to focus their artistic research on concepts such as 'divenire' and 'variazione' emerges early on in the artistic collaboration of Gruppo T's members, especially in the preliminary notes for the elaboration of the statement 'Miriorama 1'.[210] These brief notes are even more interesting than the official statement itself because they focus entirely on the primary role of the audience, underscoring how its role was an essential feature from the very beginning of their artistic adventure. The importance of visual perception is described as a fundamental discussion topic, which again exemplifies the new interest of the period in the functioning of human beings.[211] Another important sentence in these notes is 'noi faremo divenire lo spettatore insieme all'opera', a clear reference to the mutual and indissoluble connection between the observer and the artwork, which serves to define both. This sentence expresses a fundamental concept: the audience is part of the artwork itself. This point of view recalls Eco's concept of an *open work* that must be enacted and enjoyed by the user to be considered complete.[212] The interpretative relativism of the audience is combined, then, with the 'variazioni in divenire' of the artwork itself, creating an innovative concept of and attributing a new function to the work of art.

Concerning the artwork's functioning, the relationship between the audience and the art object should also be analysed from a didactic viewpoint. An important concept emerges from the preliminary draft: 'renderà lo spettatore cosciente del suo stesso divenire', that is, the functioning of the artwork can contribute to educating the audience, making it aware of the dynamic nature of the surrounding reality. Art can therefore improve the observer's self-awareness by offering an enjoyable experience. This analysis clearly shows how Gruppo T's artistic production was characterized by an edutainment feature, which was an urgent necessity and typified numerous artistic events in that decade.[213] To be precise, the activity of programming was considered an adequate way of both educating the onlooker on their cognitive reactions to a work of art and, simultaneously, creating entertainment for them.

Another concept mentioned in this philosophical and theoretical, first draft of Gruppo T's programmatic text is the remarkable correlation between 'scienza – conoscenza – arte', which becomes evident in the statement 'inoltre noi proponiamo all'attenzione del pubblico degli esperimenti in cui colori, forme, superfici in variazione possono costituire i mezzi coi quali ci esprimeremo'. Hence, interdisciplinary contaminations with the scientific environment seem necessary to bolster the new cognitive function of art: the term 'esperimento' – as an alternative for

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[210] The draft is composed of two typed pages with some handwritten notes and is published in *Davide Boriani: Arte cinetica, programmata, interattiva*, pp. 86-87.

[211] 'Noi proponiamo invece un'arte che si rivolga direttamente alla percezione visiva, usando mezzi essenziali nella loro totalità originaria'. See *Davide Boriani: Arte cinetica, programmata, interattiva*, p. 87.

[212] Eco, *Opera aperta. Forma e indeterminazione nelle poetiche contemporanee*, p. 78.

[213] On the use of the term 'edutainment' see note 60, Chapter 1, section 1.1.2.

the artwork – shapes this new tendency. This is a preliminary demonstration of the association between the idea of a rational aesthetics as theorized by Bense, the theory of *open work*, and the search by this new kind of artist for the definition of a productive artistic experience that could be shareable and enjoyable by everyone, thus developing knowledge and awareness in equal measure. It must be noted that, in this first phase, the explicit reference to the concept of 'programming' – later theorized by Eco and Munari – was absent. Nevertheless, the ideas of variation and movement, associated with the interdisciplinary influences of science and technology, can be considered the direct precursors of this term.

A last observation regarding the preliminary notes of the statement can further highlight the groups' stylistic differences in interpreting and representing the intertwining of space–time. As I have already anticipated, and as I will explain further when I analyse some works in more detail, Gruppo T's production differs from Gruppo N's because of a greater attention to the real dynamism of the experiments that it conceived. The last note of the provisional text, in fact, points out that 'non momento fermato, non sensazione dinamica, ma dinamismo'.[214] This programmatic note is significant because it highlights the clear and decisive stylistic imprint of the group, which did not limit itself to an imitation of the movement in order to dialogue with the observers and stimulate them perceptually, but which believed in the creed 'il divenire sia espresso attraverso il divenire'.[215]

2.1.2 The Exhibition Design of 'Miriorama 1'

A message of thanks to the five artists who contributed – with one artwork each – to the exhibition design can be found at the end of the official programmatic text of 'Miriorama 1': Enrico Baj (1924–2003), with an artwork taken from his series of glasses (fig. 12); Fontana, with one of his famous cuts; Manzoni, presenting one of his lines; Munari, with a *Macchina inutile*; and Jean Tinguely (1925–1991), who participated in the event with a kinetic machine. The presence of these artistic objects is useful to understand what inspired Gruppo T's artistic production and, at the same time, how they contributed to the evolution of their artistic research.

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[214] See *Davide Boriani: Arte cinetica, programmata, interattiva*, p. 87.
[215] Ibid.
It is difficult not to spot a reference to Futurism in Gruppo T's declarations about the role of dynamism in their idea of art. An in-depth analysis is outside the remit of this thesis, but I can offer a brief reference to the vast production of Futurist manifestos. In particular, a text that is worth citing in this context is Umberto Boccioni's *La scultura futurista*: here the artist underscores that 'in scultura come in pittura non si può rinnovare se non cercando **lo stile del movimento**' in order to eliminate any boundaries between the sculptural work and the surrounding environment, and to ensure that the work flows into this environment and is subject to the same physical laws that regulate it. See Umberto Boccioni, 'La scultura futurista' in *Marinetti e i futuristi*, ed. by Luciano De Maria (Milan: Garzanti, 1994), pp. 67- 74.

Baj was the principal exponent of the Movimento Nucleare, founded in Milan in 1952. Its programmatic manifestos contain an evident reference to the research carried out by Gruppo T. Inspired by 'la nuova realtà dell'atomo', the Nuclearisti developed the simple concept of 'gesto' to express, on the canvas, a type of aesthetic that was inspired by atomic and molecular dynamics. These artists realized that, at the beginning of the 1950s, there was an urgency to express – through art – a new revolutionary aesthetics inspired by the reality in which it was developing.[216] Thus, in the *Manifesto della Pittura Nucleare* of 1952, they theorized the following:

> Le forme si disintegrano: le nuove forme dell'uomo sono quelle dell'universo atomico. Le forze sono le cariche elettriche. La bellezza ideale non appartiene più ad una casta di stupidi eroi, né ai robot. Ma coincide con la rappresentazione dell'uomo nucleare e del suo spazio.[217]

The reference to an atomic universe and to electricity reveals the common interest of the two Milanese groups in experiments that included a line of reasoning on science's role in the development of a new definition and function of art. Another striking similarity with the Movimento Nucleare is the idea of the artwork's instability, expressed in the *Manifesto contro lo stile*, published in 1957: 'Noi affermiamo l'irripetibilità dell'opera d'arte: e che l'essenza della stessa si ponga come presenza modificante in un modo che non necessita più di rappresentazioni celebrative ma di presenza'.[218] The idea of a work as a 'presenza modificante' fits perfectly with the concepts of 'divenire' and 'variazione' that Gruppo T had theorized since 1959: an *open work* cannot be static, and the artist must adapt it to the ever changing environment that surrounds it.

The homage to Tinguely was motivated by the artist's studies of three-dimensional objects composed of mechanical elements that were moved by an electric motor. Compared to Gruppo T's artworks, though, Tinguely's research was closer to the Surrealist concept of assemblage, combined with a Dadaist sense of humour (fig. 13).[219] Ludic and ironic features are prevalent in his creations, which however lack any reference to the idea of planned mechanical projects to be consciously

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[216] See Marco Bugatti, 'Il Movimento Arte Nucleare', in *Arte in Italia*, ed. by Luciano Caramel (Milan: Vita e Pensiero, 2013), pp. 123-131 (pp. 125-6) and Gillo Dorfles, *Ultime tendenze nell'arte d'oggi: Dall'Informale al Neo-oggettuale*, 26th edn (Milan: Feltrinelli Editore, 2011), p. 228.

[217] Published on 1 February 1952 for an exhibition at the Galleria Apollo in Brussels, the Manifesto was signed by Baj and Sergio Dangelo. See Bugatti, p. 129.

[218] Ibid., p. 130.

[219] *Jean Tinguely: Retrospective*, ed. by Margriet Schavemaker, Barbara Til, Beat Wismer (Köln, Buchhandlung Walther König, 2016), pp. 38-9.

experienced.[220] Nonetheless, Tinguely's works – combining sounds and movements – are significant for my thesis because of the artist's attempt to involve, amaze and interest the viewer.[221]

Manzoni was listed among the artistic inspirations of the future Arte Programmata artists because of his strong connection with the two groups, which resulted from their mutual participation in a very busy exhibition season, between 1959 and 1960. Manzoni's research into three-dimensional and multi-material monochromes can be associated with Gruppo T's first experiments on canvas. This common artistic research path led to a collective exhibition at the Azimut Gallery, between December 1959 and January 1960 (for more details on this collaboration see Chapter 3, section 3.3).

The development of the so-called 'pittura-oggetto' is one of the first examples of an investigation into the concept of space and three-dimensionality, along with the contribution of Spatialism as theorized by Fontana.[222] Fontana is, indeed, one of Gruppo T's main inspirations, thanks to both his studies on motion and his interpretation of the concept of space. The composition of the *Manifiesto Blanco* in 1946 was the first step of a complex reflection that the artist conducted between the 1940s and the 1950s, in view of the need for an innovative and – above all – integral kind of art that reflected the overcoming of the concepts of sculpture and painting and the new role acquired by space.[223] Fontana's research seemed to focus on the realization of a typology of art that could have the same features as the variable and mutable environment in which it was being developed:

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[220] The American kinetic sculptor George Rickey – in the article 'La morfologia del movimento: uno studio sull'arte cinetica', published in *il Verri* journal – makes the following observation: 'Tinguely, lo scultore svizzero neo-dada di relitti di mare meccanicizzati, nelle sue macchine che battono colpi a tempo di rock-and-roll, ha impiegato un periodo che, pur essendo troppo lento per giungere alla continuità della vibrazione, non è abbastanza lento da permettere la contemplazione del movimento stesso'. See George Rickey, 'La morfologia del movimento: uno studio sull'arte cinetica', *il Verri*, 22 (1966), 66-87, (p. 74).

[221] Frank Popper, *Origins and development of Kinetic Art* (London: Studio Vista, 1968), pp.131-132.

[222] Fontana is surely one of the major interpreters of a type of art that combines painting and sculpture. In the preliminary notes for Gruppo T's Manifesto of 1959, a reference is made to the impossibility of considering painting and sculpture separately, specifying that Futurism – even before the Spatialist movement had developed – was the precursor of this way of thinking. For this reason, it is worth citing, among others, Enrico Prampolini's article of 1915, *Un'arte nuova? Costruzione assoluta di moto-rumore*. The text discusses some of the theories that were developed in the 1960s, but which were characterized by a more emphatic and lyric enthusiasm. A necessity to adapt artistic expressions to a new rhythm of life had emerged at the very beginning of the century: 'Vivendo in questa scoppiettante e spiralica vita dinamica d'oggi, di moto-rumore, come possiamo rimanere estranei alle poderose ed eccitanti sensazioni che si scaricano e si espandono simultaneamente intorno a noi? […] Di fronte a ciò, la pittura, la scultura, l'architettura, e tutte le altre arti, concepite a sé, non hanno più valore, essendo impotenti di raggiungere (separatamente) quell'efficacia emotiva, quel risultato d'espressione materiale, parallelo. […] È l'arte che si tuffa nella scienza o viceversa? No. Ma se fosse, quale amalgama più audace e inaudita nell'evoluzione del genio umano?' See Filiberto Menna, 'Attualità e utopia dell'arte programmata', *Filmselezione*, 15-16 (1963), 79-87, (p. 83). Boriani himself, in his contribution to the retrospective curated by Lea Vergine (*Arte programmata e cinetica (1953-1963). L'ultima avanguardia*), makes the following declaration: he admits that, in his analysis of the way the concept of space–time had been interpreted in the history of art, he found inspiration from the aforementioned *Manifesto della scultura futurista* by Umberto Boccioni, see *Gruppo T: Miriorama, le opere, i documenti*, p. 13.

[223] See Cecilia De Carli 'Lo Spazialismo', in *Arte in Italia*, pp. 99-110 (pp. 109-110).

La vita tranquilla è scomparsa. La nozione del rapido è costante nella vita dell'uomo […] L'uomo si fa sempre più insensibile alle immagini inchiodate senza indizi di vitalità. Le antiche immagini immobili non soddisfano più le esigenze dell'uomo nuovo […] Il cambiamento è la condizione essenziale dell'esistenza. Il movimento, la proprietà di evolversi e svilupparsi è la condizione base della materia […].[224]

These words reflect an urgency for the new generation of artists to draw inspiration from the surrounding technological and scientific context, for the purpose of an artistic production that tickles the observer from a perceptual point of view. The evolution and dynamism that are typical of the scientific context of the time also have to take into account the artistic world highlighting the great emphasis that Fontana placed on the concept of interdisciplinarity. In his *Manifesto tecnico dello Spazialismo* (1951), the need for a new aesthetics that considers the presence of science in every aspect of modern life is evident:

Le scoperte della scienza gravitano su ogni organizzazione della vita. La scoperta di nuove forze fisiche, il dominio della materia e dello spazio impongono gradualmente all'uomo condizioni che non sono mai esistite nella sua precedente storia. […] Si va formando una nuova estetica, forme luminose attraverso gli spazi. Movimento, colore, tempo, e spazio i concetti della nuova arte […].[225]

The aforementioned inspirational features all seem to come together in Munari's *Macchina inutile* (fig. 14). The idea of a useless machine, in fact, summarizes the concept of an abstract artwork characterized by three-dimensionality and casual movements (for an in-depth analysis of Munari's works and his influence on Gruppo T, see Chapter 3 section 3.1). This kinetic feature allows for an investigation into the role of artistic objects in space, introducing one of the themes that were most often explored by Gruppo T's artists: the relationship between the audience and the artwork within a space. Moreover, the movement of useless machines plays with the observers' perceptual relativism, anticipating the study of multi-stimuli perception carried out by kinetic groups.[226] In addition to the study of three-dimensional movement in space, it is possible to identify another direct connection between Gruppo T and Munari: the *Manifesto del Macchinismo*. In this programmatic text, written in

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[224] *Manifesto Blanco*, 1946. See *Manifesto Blanco*, ed. by Ugo Mulas, Guido Le Noci (Milan: Edizioni Galleria Apollinaire, 1966).
[225] For the text of the Manifesto see De Carli, 'Lo Spazialismo', pp. 99-110 (p. 109).
[226] Giovanni Rubino 'Bruno Munari versus Programmed Art: A Contradictory Situation, 1961-1967', in *Bruno Munari: The lightness of Art*, ed. by Pierpaolo Antonello, Matilde Nardelli and Margherita Zanoletti (Oxford: Peter Lang, 2017), pp. 89-111 (p. 91).

1938 and republished in 1952, Munari praised the presence of machines in society, but he considered it worthwhile to limit this presence and to specify their functioning because they could be extremely perilous.[227] The recommended solution is to put technology at the service of art in order to make it innocuous. Thus, the final solution is to transform a machine into a work of art:

> Il mondo, oggi, è delle macchine. Noi viviamo in mezzo alle macchine […] Gli artisti devono interessarsi delle macchine, abbandonare i romantici pennelli […] devono cominciare a conoscere l'anatomia meccanica, il linguaggio meccanico, capire la natura delle macchine […] La macchina di oggi è un mostro! La macchina deve diventare un'opera d'arte! Noi scopriremo l'arte delle macchine![228]

An interest in the development of a kind of art that combines the rigour of the machine with an ironic and amusing artistic attitude clearly emerges from these few lines. In Munari's words, art appears as an element of conjunction between society and the scientific and mechanical development in progress. Like cybernetics, which puts technologies at the service of human beings to improve the knowledge of human functioning and biology, modern art should use machines to exploit the educational and stimulating role that connects them with modern humankind.

Concerning the artworks shown during 'Miriorama 1', three of the four collective 'opere in divenire' were characterized by phases and variations. However, this constant and fluid alteration was not the result of a programming endeavour but the consequence of either natural, physical reactions or the use of natural elements such as CO_2.[229] The deformation of the surface of one of the artworks due to heat, or the iridescent haloes caused by the oxidation of copper, can be compared to the absence of shapes and material consistency, all distinctive peculiarities of the Informale style.[230]

The fourth work, *Grande Oggetto Pneumatico – Ambiente a volume variabile* (fig. 15 and 16), requires a more complex analysis; it is, in fact, the first *environment* ever designed by Gruppo T,

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[227] Giorgio Maffei, *M.A.C. Movimento Arte Concreta, Opera editoriale* (Milan: Edizioni Sylvestre Bonnard, 2004), p. 155.

[228] Ibid.

[229] This is how Crispolti describes the objects exhibited at the Galleria Pater, underlining a certain material and informal characterization of these works: 'La messa in moto, la messa in variazione, non di puri elementi formali, come nella programmazione concretista, bensì di materie, direi anzi piuttosto di situazioni materiche'. See Crispolti, 'Neoconcretismo, arta programmata, lavoro di gruppo', pp. 20-67 (p. 43).

[230] 'Miriorama 1' hosted four collective works where the Informale perspective is linked to the idea of movement and evolution: *Pittura in Fumo*; *Superficie in ossidazione*, *Superficie in combustione* and *Grande Oggetto Pneumatico*. The exhibition also presented documents and images from Boccioni, Brancusi, Duchamp, El Lissistki, Gabo, Kandinsky, Klee and Fontana's *Manifiesto Blanco* – all essential features to understand the evolution of kinetic theories. Details of the event and a map of the exhibition room can be found in *Davide Boriani: Arte cinetica, programmata, interattiva*, pp. 92-93.

[231] and it requires the observer's complete involvement.[232] It is an installation composed of six transparent PVC tubes where air is alternately let in and out; their inflation and deflation movements variously shape the exhibition space, each time in a different way. Making its way through the audience, the inflated tubes forces people to move and leave the space. This electric and air-operated installation conveys some of the principal features of what will be called Arte Programmata: the movement of its extremities, the settlement in a three-dimensional space and, most of all, the observer's direct and unavoidable interaction. Concerning the audience, Munari – in a discussion of this installation in an article titled 'I giovani del Gruppo T', published in 1961 in *Domus* magazine – underscored a number of fundamental aspects and features of the relationship between kinetic artworks and common observers.

First of all, with regard to the *Grande Oggetto Pneumatico*, Munari identifies two variables that influence the work's relationship with the observer: space and time. Space refers to the fact that the work invaded the exhibition area, whereas time reflects the work's self-expression through its own rhythmicity – a progression of moments in which the tubes extend and contract. In addition, the Milanese artist revealed the audience's impossibility to completely understand the work without guidelines for interpretation. With the statement, '[i] visitatori erano piuttosto disorientati non sapendo "come" guardare questi oggetti', Munari admitted to the presence of a gap – in terms of comprehension and awareness – between artists and audience.[233]

2.2 A Closer Look at Gruppo T: The Series of 'Miriorama' Displays and the Birth of the Concept of Programming

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[231] To further consolidate Gruppo T's interest in Fontana's production, I must point to the fact that Fontana presented his first *environments* in 1949 and 1951. The second was accompanied by the *Manifesto tecnico dello Spazialismo*, where Fontana specifies the following: 'Concepiamo la sintesi come una somma di elementi fisici: colore, suono, movimento, spazio, integranti in un'unità ideale e materica'. For the text of the Manifesto see De Carli, 'Lo Spazialismo', pp. 99-110 (p. 109).

[232] Concerning the innovative and provocative nature of this work, it is necessary to highlight its role as a real precursor of the many *environments* that individual members of Gruppo T created from 1964 onwards. In particular, Colombo worked extensively on the concept of *environment*, winning the Venice Biennale in 1969 with an *environment* called *Spazio Elastico*. See *XXXIV Biennale internazionale d'arte: Venezia, 22 giugno - 20 ottobre 1968* (Venice: Ente Autonomo La Biennale di Venezia, 1968), p. 12.

[233] 'Nella galleria dove avvenne la manifestazione, grandi plastiche invadevano tutta una sala e poi si ritiravano alternativamente. Era un grande oggetto fatto di plastica trasparente tubolare che si gonfiava e si sgonfiava automaticamente. I visitatori erano piuttosto disorientati, non sapendo "come" guardare questi oggetti'. Bruno Munari, 'I giovani del Gruppo T', *Domus*, 378 (1961), 53. A discussion of the difficult reception of the innovations brought about by twentieth-century avant-gardes falls outside the scope of this thesis. However, Munari's statements on *Domus* may be worth considering for future research into the public reception of contemporary Italian art after the Second World War, perhaps with a specific focus on sources such as newspapers and sector magazines and on the judgement of critics and experts.

2.2.1 An Innovative Research Approach: an Analysis of the 'Miriorama' Leaflets

After the collective 'Miriorama 1' exhibition, Gruppo T's activity continued with the solo shows of Boriani, Devecchi, Colombo and Anceschi: called 'Miriorama 2', 'Miriorama 3', 'Miriorama 4' and 'Miriorama 5', respectively. In March and April 1960, the second and the third collective exhibitions were organized at the Galleria Pater in Milan and at the Galleria San Matteo in Genoa ('Miriorama 6' and 'Miriorama 7', respectively).[234] If we analyse more closely the self-introductions written by the above-mentioned artists for the individual show leaflets, a constant progression towards a well-defined concept of programming – that will find a better expression in the 'Arte Programmata' exhibition of May 1962 – emerges.

Boriani's introductory text for his solo display 'Miriorama 2', reflects a search for the constituting elements of a work of art: in other words, its structure. Boriani was interested in the elementary components that constitute the artistic object, recalling the rational concept of aesthetics as developed by Bense. The identification of basic modular structures in the work of art is necessary to attribute a concrete value to the concept of space–time variation, which would otherwise only have a traditional symbolic value. What the artist seeks is the full awareness of the becoming nature of his artworks through the precise analysis and enactment of its constitutive elements; the latter are programmed so as to operate in a specific order, thus showing 'la sequenza delle immagini che si trasformano continuamente', and not just the idea of movement.[235] The concept of uninterrupted sequences of images is comparable to the idea of programming as Munari theorised one year later: 'un tipo di progettazione che permette infinite o molte varianti dello stesso tema'.[236] Identifying and being aware of the basic elements of a movement therefore helps to create and work with variations of sequences that the artist can programme beforehand.

Devecchi, in 'Miriorama 3', continued the investigation of the artwork as a *concept-in-becoming* by further exploring the idea of space and time; motion, in fact, repeatedly modifies the relationship between the object and the surrounding space. First introduced by the avant-garde work *Grande Oggetto Pneumatico – Ambiente a volume variabile*, this preliminary analysis of the notion of space highlights how the object's evolution, that is to say each dynamic sequence that could be

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[234] 'Miriorama 2', 19 – 27 January 1960; 'Miriorama 3', 29 January – 7 February 1960; 'Miriorama 4', 9 – 18 February 1960; 'Miriorama 5', 20 – 29 February 1960; 'Miriorama 6', 3 – 6 March 1960; 'Miriorama 7', from 2 April 1960. See *Gruppo T: Miriorama, le opere, i documenti*, pp. 27 – 39.

[235] 'Lo stesso bisogno di concretezza […] determina la necessità di considerare ai fini dell'opera fenomeni spazio-temporali nel loro individuarsi elementare […] non per mostrare l'immagine in un movimento che si ripete indefinitamente, ma per dare la sequenza delle immagini che si trasformano continuamente'. See *Davide Boriani: Arte cinetica, programmata, interattiva*, pp. 104-105 for the picture of the leaflet and the transcript of the text.

[236] Munari made this statement during an interview with Meneguzzo in 1995. See *Programmare l'arte: Olivetti e le neoavanguardie cinetiche*, ed. by Marco Meneguzzo, Enrico Morteo, Alberto Saibene, p. 136. The catalogue includes a number of interesting interviews with some members of Gruppo T and Gruppo N, and contributions by Munari, Enzo Mari and Getulio Alviani.

generated, leads to a continuously different relationship of the observer with the work itself and with the space that surrounds it:

> Nei miei quadri il susseguirsi degli avvenimenti che in ogni attimo si determinano nei punti diversi dell'opera cambia nel tempo il valore dei rapporti spaziali dell'opera. Da questo deriva che queste mie opere quando non sono in movimento hanno solo interesse in quanto contengono infinite possibilità di successive variazioni.[237]

From a temporal viewpoint, Devecchi helps the observer to understand the fluidity of his creations and the idea of 'becoming' through the support of photography. In the leaflet of his solo exhibition, a detail of one of his works – *Superficie in vibrazione* (see Chapter 4, section 4.2.1 for an exhaustive description of the piece) – is reproduced with the caption '"2' di superficie in divenire"'. The artwork can therefore not be separated from its temporal element because, if suspended at a precise moment, the object would lose its meaning and function (fig. 17). If the static work of art itself possesses infinite possibilities of successive variations, it becomes necessary to programme its functioning so that it can best express every possible variable in front of the observer. One of the works that best expresses this intrinsic relationship between kinetic works and the observer's interaction in space and time is *Oggetto a linee d'aria*, created by Devecchi in 1961 (fig. 18).[238] When manually pressing special rubber buttons, puffs of air come out of invisible, pierced holes on a semi-curved surface. The buttons are placed in such a way that, when pushed, they bring the viewer's face at the right distance to feel the puffs of air. Each button is connected with a single hole in a random way, so as to make the point of emission of the air unpredictable. Hence, in conceiving and programming the artwork, the artist foresees the possibility that the work in action may have multiple possibilities of expression and variation. In other words, by structuring the work, the artist plans its subsequent interactions with the observer who will physically act on the artistic object. The element of randomness that is present in the artistic experience is strictly related to the observer's subjectivity: each visitor will choose a different sequence of buttons to press and their sensory, spatial and temporal relationship with the artistic object will therefore be different each time.

Colombo's text for 'Miriorama 4' probably provides the most complex and advanced definition of the innovative and evolving idea of programming; it contains all the peculiarities of Arte Programmata as Eco formulated these for the movement's first official exhibition in 1962. Colombo

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[237] See *Davide Boriani: Arte cinetica, programmata, interattiva*, p. 118 for the picture of the leaflet and the transcript of the text.

[238] See http://www.gabrieledevecchi.it/opera.php?idO=28 [accessed 21 April 2021] and *Arte Ri-Programmata: Un manifesto aperto*, ed. by Serena Cangiano, Davide Fornari, Azalea Seratoni (Monza: Johan & Levi Editore, 2015), p. 124.

specifies the relationship between kinetics and the study of the observer's perceptual capabilities by underlining how, along with the study of human perception, his artworks are essential to demonstrate what role the observer's personal approach plays. Colombo's statement clearly conveys all the opposing peculiarities that characterised the Arte Programmata movement: the rigour of the artwork's planned kinetic sequences; the development of the observer's planned involvement; the subsequent emotional and subjective reaction to the stimuli offered by the interaction as well as by the unpredictable consequences of kinetics in the artwork's structure. In short, in Colombo's words, kinetics does not only concern the artwork, but also the observer who interprets it through the movements of their body and eyes. The observer therefore interacts with the work through an attitude that is, at first, respectful of the rules that the artwork imposes and, subsequently, by varying it according to their own subjectivity:

> Spontaneamente le facoltà ricettive dell'occhio sono attratte verso ciò che è in movimento. Da tempo ho cominciato a stabilire sul piano del "quadro-oggetto" dei dislivelli, in modo che l'occhio dello spettatore scorrendo sulla superficie, fosse costretto a salire e scendere da spessori, ad entrare e uscire da cavità indagando gli aspetti che la luce in naturale variazione determinava nel quadro. Solo nei quadri che ora espongo un autentico variare si attua contemporaneamente a quello dell'occhio (e dell'umore) dell'osservatore. Do oggi ai miei quadri delle possibilità che si attueranno solo nella velocità in un ordine di successione imprevedibile così il turbarsi dell'uniformità di queste superfici potrà rappresentare un vero e proprio sorprendente dramma.[239]

The variations and kinetics in Colombo's works inevitably lead to unpredictable and unplanned aesthetic situations that enrich the artistic experience. One of the works exhibited at 'Miriorama 4' that effectively describes this idea of orderly planning and subsequent executive indeterminacy is *Superficie in variazione* (fig. 19), designed in 1959. It consists in a monochromatic textile surface connected to an internal device, triggered by a series of levers that are attached to the base of the artwork. The observer can pull the different levers, causing indentations on different chosen points of the surface. In *Superficie in variazione*, the variations and mutations that the artist has programmed

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[239] See *Davide Boriani: Arte cinetica, programmata, interattiva*, p. 119 for the picture of the leaflet and the transcript of the text.
It is interesting that Colombo introduces the term 'quadro-oggetto' in his text, which perfectly identifies the origins of his research. In the article 'Situazione delle esperienze cinetiche e visuali in Italia', which describes the variety of studies on kinetics, Menna also introduces the figures of Scheggi and Bonalumi, two practitioners of the 'pittura-oggetto' movement whose production is exemplary of the various studies on motion. See Filiberto Menna, 'Situazione delle esperienze cinetiche e visuali in Italia', pp. 104-114 (p. 112).

consist in the interactions with observers through the particular physical conception and structuring of the work itself, and in the fact that the users' manipulations provoke inward flexions on the textile surface of the work. However, what is not possible to calculate – the so-called element of unpredictability – is the users' choice to pull one lever rather than another, the order in which these levers are pulled, and the consequent pattern that will appear on the canvas. Obviously, patterns are always different depending on the intensity with which the levers are pulled and the number of levers that the observer pulls. It is therefore clear that the true nature of the work – all its potentialities, its aesthetic peculiarity – is best expressed not before or after the interaction but while the work is being 'used', manipulated, touched and modified by the observer.

Finally, 'Miriorama 5' presented Anceschi's production. In the relative leaflet, the artist draws the reader's attention to two key elements: the temporality of his creations and the crucial programming and designing phase for the subsequent functioning and motion of the artworks, which acquire a greater value compared to the static idea of a piece of art. From the artist's words a paramount idea emerges that the work of art acquires greater importance and meaning while it evolves and changes, not when the kinetic sequence is complete. The 'becoming' phase of an artwork is, then, the best expression of its nature.

> Mentre dipingevo i quadri, che ormai chiamo statici, ero attratto più dal farli che dall'averli fatti. Mi spiego: mi interessava di più veder scendere la sabbia verso la superficie collante che osservare la superficie ottenuta; mi dava maggiore emozione il muoversi pregno di possibilità delle colle e delle vernici sulla superficie, che il loro effetto finale. Era dunque durante il farsi delle immagini che io avvertivo la presenza di qualcosa capace di stimolarmi, e non quando l'immagine era fissata […].[240]

The artist rendered the idea of the flowing of time while the artwork physically moves and constantly becomes something new through a series of *Tavole liquide* (fig. 20) that observers could manipulate, exhibited during 'Miriorama 5' at the Galleria Pater and also in other following exhibitions. The *Tavola liquida* is composed of two square Rhodoid sheets that have been sealed: an amount of red, aniline dyed mineral oil has been spread between the two sheets. The work was then hung on a stirrup held by two pre-existing electrical cables; on the back of the work, framed in wood, four round hooks allowed the visitors to hold it in their hands and put it upside down and then back into place again.[241] The work is already programmed – ever since its conception in the artist's studio – to be manipulated

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[240] See *Davide Boriani: Arte cinetica, programmata, interattiva*, p. 120 for the picture of the leaflet and the transcript of the text.
[241] See http://www.reprogrammed-art.cc/library/84/Tavola-di-possibilit%C3%A0-liquide [accessed 28 April 2021].

by the visitor. How much it will be moved and shaken, how the viscous liquid inside will expand and what patterns will be created along the surface are all unexpected and unpredictable features, consequences of direct and subjective human interaction. The most interesting feature of this production is the fact that these works produce 'immagini in "variazione irripetibile", ottenuta con l'intervento collaborativo dell'osservatore'.[242] This means that, while departing from the same artwork, each observer will create a different final object characterised by a unique pattern created by the liquid.

In the progression of the exhibitions, 'Miriorama 8' represents another fundamental step in the movement's definition and, at the same time, in the analysis of its weaknesses. The exhibition, which took place on 16 December 1960 at the Bruno Danese design showroom in Milan, was curated by Munari and titled 'Multipli del Gruppo T'.[243] The peculiarity of this edition was the absence of artworks or experiments of great size; instead, it favoured small, handy objects that could be replicated as common design creations. This allowed Gruppo T to introduce another issue that would be theorised by the Arte Programmata movement: overcoming the preconception of the uniqueness of art. Indeed, the exhibition demonstrates the incredible versatility of Gruppo T's members, who were able to re-invent themselves and move from being programmers of immersive environments and designers of artworks tailored for galleries to becoming developers of replicable objects. In 'I giovani del Gruppo T', Munari underlines the elevated technical accuracy of these objects, some of which were truly miniature reproductions of actual kinetic installations by Gruppo T. It is necessary to highlight the importance of this artistic choice based on the artwork's new definition and function, which were being developed in those years thanks to philosophers such as Bense and Moles. Since the artist's new rational purpose was to 'test' the mutual exchange of information and signs between the artwork and the observer, the exclusivity of the physical components of the artistic objects were relatively important. It was of great importance that the way they were designed ensured the right interaction with the public.

The art objects displayed during 'Miriorama 8' were the following: *Rotoplastik* by Colombo (fig. 21 and 22), a wooden object with different layers made of various shapes that could be combined according to predetermined movements and joined in different ways if the object was disassembled; *Miramondo* by Devecchi, a series of viewers through which the observer could look at anything through them with different optical effects; *Sferisterio semidoppio* by Varisco, where hemispherical shapes were doubled in a specular surface and presented through a coloured framework lattice, allowing the observer to create different combinations of shapes by moving the object; *Abstract video*

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[242] See *Arte programmata e cinetica (1953-1963). L'ultima avanguardia*, ed. by Lea Vergine, p. 74.

[243] Munari, Devecchi and Mari worked as individual designers for the Danese company on many occasions.

by Anceschi, where the shapes that ran through the octagonal video slowly changed – due to a liquid mass – every time the observer handled the object as an effect of gravity; *Giradischi ottico-magnetico* by Boriani (fig. 23 and 24), a disk composed of iron filings under glass and magnets that created different shapes depending on how the observer manipulated the object.[244] Kinetics is intrinsic in the planning phase and in the activation of these objects which, through the manipulation by and direct interaction with the observer, are cyclically subjected to sequences of alterations and movements that make it impossible for them to return to their initial status.

This choice to exhibit replicable objects reinforced the concept embodied by the design production system of those years, that is, the importance of a wide democratization of aesthetic objects. What matters is the artistic experience that can be obtained through the physicality of the artwork: if the object can be easily reproduced through the use of industrial materials, then it will lose any kind of elitist value, instead promoting a democratization of the artistic consumption.

In this specific case, the pieces exhibited at 'Miriorama 8' can be considered hybrids: halfway between non-functional artworks and design objects. The objects Gruppo T exhibited at the Danese showroom probably drew inspiration from Munari's studies on the concept of art multiples that he conducted in those years.[245] In order to explain the works displayed at 'Miriorama 8' correctly, we therefore must rely on Munari's writings that theorized the concept of art multiples.[246] According to Munari, multiples have the purpose of communicating aesthetic information to a wide audience: they are designed to make the observer understand an aesthetic fact in a direct and functional way. The public actively participates in this artistic consumption and – through the handling of these objects – learns either basic notions of optics or the functioning of chromatic perception. Munari emphasizes how these objects are made using the same research methods applied in the creation of design articles. In fact, they are the result of previous visual and perceptual experiments as well as of meticulous

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[244] See Munari, 'I giovani del Gruppo T', p. 53 and *Arte Ri-Programmata: Un manifesto aperto*, ed. by Serena Cangiano, Davide Fornari, Azalea Seratoni (Monza, Johan & Levi Editore, 2015), pp. 126-131.

[245] Research on the evolution of the concept of kinetic art and its different interpretations over time also depends on the study of the influence that certain exhibitions have had on the theoretical characterization of some groups and on their creative choices. It would be interesting to analyse how crucial Munari's presence at some decisive exhibitions has been for the determination of kinetic art and art multiples, and the extent to which his presence influenced artists such as those from Gruppo T and Gruppo N. The most important exhibitions – all related to kinetics – are: 'Vision in motion - Motion in vision', held in Antwerp in 1959; 'Edition MAT', held in Paris again in 1959, and 'Prima mostra delle opere animate e moltiplicate', held at the Galleria Danese in Milan in 1960. In particular, an in-depth study of 'Edition MAT' and 'Prima mostra delle opere animate e moltiplicate' – in which the artist Mari participated, along with Munari – would shed light on the influence of international trends on Gruppo T's preparation of the series of multiples displayed at 'Miriorama 8' and 'Miriorama 9', in Milan and Tokyo respectively. For an extensive analysis of all the 'Edition MAT' exhibitions see *Multiplied: Edition MAT and the Transformable Work odf Art, 1959-1965*, ed. by Meredith Malone (St. Louis: Mildred Lane Kemper Art Museum, 2020).

[246] See Bruno Munari, 'Che cosa sono i multipli', in *Codice ovvio* (Mantova: Edizioni Corraini, 2017), pp. 89-90. The book was originally published in 1971, by Einaudi. In Artista e designer of 1971, Munari tackled a very topical issue, namely that of the ever-increasing separation between pure art and the production of art linked to the demands of mass consumption by distinguishing the role of the artist from that of the designer and describing the latter's role in the corporate environment. See Bruno Munari, *Artista e designer* (Bari: Edizioni Laterza, 1971).

studies on materials that are meant to achieve maximum visual communication. Furthermore, the relationship between the artwork and its reproductions, where the unique piece is of a clearly superior quality, is completely reversed when considering the multiples and their prototype, which is of a lesser quality.

This exhibition underlines Gruppo T's desire to include ludic elements in the artistic experience in order to engage the observer. Although the combination of education and entertainment found one of its best expressions in this exhibition, the ludic component seems to have dominated over the didactic, or scientific, purpose. This hypothesis can be justified by the onlooker's greater engagement – compared to the previous Miriorama events – with these handy objects, as Munari pointed out: 'Qualche mese fa questi giovani artisti hanno esposto alla galleria Danese di Milano, una serie di oggetti nuovi, prodotti in dieci copie (anche il preconcetto del pezzo unico non ha più senso ormai) e questa volta con un vero interesse del pubblico'.[247] Trying to explain these words it can be useful to cite Dorfles who in his article 'Preambolo all'Arte Programmata', published in 1966 in *il Verri*, specified the role of Arte Programmata in those years, stating that the latter must be appreciated for its 'predeterminazione progettuale'; at the same time, though, the critic described the works as a 'disegno industriale inutile'.[248] The novelty of 'Miriorama 8' was cutting edge: motivated by their belief in artistic democracy, the artists presented a replicable series of objects produced following the rules of Industrial Design, but apparently useless. Clearly, there is a strong link between the concept of a non-functional, exquisitely projected work and its ludic end use. In fact, the presence of Munari – and his research in this field – was fundamental for the development of a ludic component in Gruppo T's experiments.[249]

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[247] See Munari, 'I giovani del Gruppo T', p. 53. It is not possible to understand, from Munari's few words, why the public appreciated these objects more than other provocations by Gruppo T, which were less fortunate in this sense (see *Grande Oggetto Pneumatico*). Perhaps the interaction with a manageable object and the highly playful component can explain this particular appreciation, but – as I have often highlighted in this thesis (see notes 233 and 258) – it is not easy to fully grasp the link that artists established with their audiences in that period. It is also interesting to compare the positive engagement of observers at the 'Miriorama 8' exhibition with the behaviour of the public during the first 'Edition MAT' in 1959. Indeed, the newspapers of the time emphasised that the public's enjoyment derived particularly from the possibility of touching the exhibited works, whereas a reflection on the radical aesthetic choices of this exhibition – the choice of exhibiting transformable artist's multiples – did not seem to particularly strike the observers. What in fact struck journalists the most was the proposed combination of mobile and transformable works that could be modified by the public. Some journalists in fact judged these works as adult, poetic and paradoxical, thus emphasising their attractive and playful potential for both adults and children. See *Multiplied: Edition MAT and the Transformable Work odf Art, 1959-1965*, ed. by Meredith Malone, p. 47 and pp. 64-65.

[248] Dorfles, 'Preambolo all'arte programmata', pp. 3-8 (p. 4).

[249] The idea of uselessness – which Munari promoted in many of his artworks, especially in the *Macchine Inutili* series – contains within itself the study of dynamism, the perception of unstable forms and the idea of an art form that must free itself in space and over time. By using poor or industrial materials, the Milanese artist introduced surprise and wonder, as well as the elegance and the mutability of nature, into the artistic experience in order to free machines from the seriousness and utility that characterize them in modern life. These are experiences that certainly have a playful characterization, even if their structuring involves a much more complex analysis. See Luigi Pralavorio, 'Delle Macchine Inutili e di altro', in *Cronaca Prealpina*, 28 May 1934; Enrico Crispolti, 'Il caso Munari', in *NAC Notiziario Arte Contemporanea*, 25 (1969), p. 7; Bruno Munari, 'Che cosa sono le macchine inutili e perché', *La Lettura*, 7 (1937).

To further elaborate the new idea of artwork in those years, we must focus on the use of the term 'oggetto' instead of 'opera', which Munari developed in this exhibition context and again chose for the 'Miriorama 11' leaflet. In Munari's text for that collective exhibition, which took place between 17 February and 1 March 1962 at Gruppo N's gallery in Padua, a certain emphasis is placed on the term 'oggetto'; this aids comprehension but, at the same time, simplifies and limits the artistic and avant-garde features of Gruppo T's works. More generally, this linguistic choice seems to raise doubts about the group's real nature and essence: it is not clear what kind of research they pursued, whether purely artistic or based on design. The same lack of certainty is evident in this passage from Munari's text, where he makes explicit that what Gruppo T represent in the artistic environment is not well defined:

Abbandonata la pittura e la scultura un Gruppo di giovani milanesi si sono avviati in ricerche e scoperte interessanti, usando materiali nuovi, mezzi nuovi e producendo oggetti non più definibili con le vecchie categorie. Caduto ogni preconcetto di forma di stile, di astratto di informale, di geometrico e non, di pittura e non pittura, si sono trovati di fronte a un mondo nuovo pieno di possibilità, con tecniche e schemi da inventare con la massima libertà.[250]

Along with Munari, the real core of Gruppo T's research is kinetics as an expression of the contemporary presence of space and time within the artwork itself. Thanks to their experiments, Gruppo T participated – again with Munari– in the exhibition 'Bewogen Beweging' ['Moved Movement'] at the Stedelijk Museum in Amsterdam in March 1961, one of the first international events that Gruppo T attended. The exhibition was defined as one of the first retrospectives of art in motion, and the choice to show the works of young avant-garde groups alongside those of Calder, Tinguely and other famous artists is remarkable; it underlines the aforementioned link between Gruppo T and the previous generations of artists who were committed to expressing kinetics through the use of mechanical elements.[251] The productive and intense collaboration with Munari gave Gruppo T the possibility to show, between December 1961 and January 1962, some of the pieces presented at 'Miriorama 8' and 'Bewogen Beweging' at the Minami Gallery in Tokyo. The

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Munari's influence on and great contribution to Arte Programmata groups is discussed in more detail in Chapter 3, section 3.1.

[250] *Davide Boriani: Arte cinetica, programmata, interattiva*, p. 130 for the picture of the leaflet and the transcript of the text and *Gruppo T: Miriorama, le opere, i documenti*, p. 45.

[251] *Bewogen Beweging*, ed. by Pontus Hultén and others (Amsterdam: [publisher not identified], 1961). The exhibition hosted works by 83 artists from 18 countries, and it included kinetic works by Tinguely, Calder, Takis, Schöffer and Bury. The exhibition was curated by Pontus Hultén in collaboration with Billy Klüver and Daniel Spoerri. It was hosted by the Stedelijk Museum, Amsterdam, from March to April 1961, the Moderna Museet in Stockholm between May and September 1961, and the Louisiana Museum in Humlebæk between 1961 and 1962.

exhibition, entitled 'Miriorama 9', displayed 15 works sized 30x30 cm and was made possible by the collaboration between Munari and the Japanese critic Shuzo Takiguchi (fig. 25).[252]

Other collaborations with artists that proved important for the development of Gruppo T's research includes that with Fontana, for the organization of the 'Miriorama 10' exhibition in April 1961, at the Galleria La Salita in Rome. Fontana, in the invitation for the event, underscores the importance of motion and time in modern art experimentation:

> Queste opere, che escono dalle categorie usuali e sono realizzate con materiali e mezzi offerti dalle scoperte della stessa civiltà attuale, propongono un'arte che nella variazione è continuamente immersa nel presente, un'arte che rifiuta la pretesa e usurata assolutezza dell'immagine per evidenziarne la relatività, che abbandona l'evocazione per la concretezza, che distrugge la forma e la ritrova nel movimento organico.[253]

The concept already expressed by Anceschi on the occasion of 'Miriorama 5' re-emerges in Fontana's words: the need for modern observers and artists to identify themselves in ever changing works of art, whose movement and relativism make them more real and authentic than many other works. In addition, this tendency recalls Dorfles's and Eco's theories about the impossibility for art to be considered disconnected from its own social and technological context. The idea of 'un'arte immersa nel presente' inevitably implies the idea of an interdisciplinary and intermedial approach that, in this decade, was growing exponentially. The 'Miriorama 12' exhibition, held from 7 to 17 April 1962 at the Galleria del Cavallino in Venice, perfectly expresses – in the relative leaflet – the 'in-betweenness' of the artistic environment of the period, combining some images of the exhibited works and a combinatory poem by Nanni Balestrini entitled *Dove guardiamo*.[254] Thus, it is possible to consider the same leaflet as a piece of art where a conscious fusion of two different media, namely images and poetic text, becomes evident (fig. 26).

2.2.2 The 'Arte Programmata' Exhibition, the European Influences and the International Reception

On 15 May 1962, Munari – in collaboration with Giorgio Soavi from the Olivetti Advertising and Development Department – inaugurated the first exhibition of Arte Programmata at the Olivetti

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[252] *Gruppo T: Miriorama, le opere, i documenti*, p. 41.
[253] *Gruppo T: Miriorama, le opere, i documenti*, pp. 42-44 for the picture of the invitation and the transcript of the text.
[254] Leaflet published in *Davide Boriani: Arte cinetica, programmata, interattiva*, p. 131. See also *Gruppo T: Miriorama, le opere, i documenti,* pp. 48-49.

showroom in Milan. The term 'programmata' was used for the very first time in the *Almanacco Letterario Bompiani 1962*; edited by Eco and Munari, this issue was dedicated to the application of electronic calculators 'alle scienze morali e alla letteratura'.[255] In the article 'La forma del disordine', Eco contextualised the new and developing idea of programming within the new technological environment of the 1960s. Gruppo T's members were among the artists who featured in this publication; they were asked to design a series of programmed graphics using cybernetic criteria. Boriani's project can be considered the most appropriate to illustrate the introduction of a fully developed idea of programming in Gruppo T's experiments. His graphic project involved a set of logic procedures meant to produce an endless series of variations of an archival image: a colour reproduction of a painting by Angelo Bronzino, *Ritratto di Lucrezia Panciatichi* (1545), divided into 400 identical modules. Each image is composed of three different matrices of numbers, each of which corresponds to a characteristic of the various module units that compose the final picture: spatial collocation, brightness and chromatic average point. Although each number of the three matrices is precisely programmed, Boriani interestingly introduces an element of chance in these permutations. He does so by generating different matrices on the basis of the original three, but with some elements that are calculated in random sequences or by subsequent operations that create almost infinite and uncontrollable variations. The artist, given an image, demonstrates that it is possible to theorize and programme endless variations of the original picture through a rational method that inevitably also involves a chance element.[256] The importance of these graphic works lies in the artists' increasing awareness of the importance of a chance element for the determination of becoming, and ever changing, artworks.

The exhibition at the Olivetti showroom was simply called 'Arte Programmata: arte cinetica, opere moltiplicate, opera aperta'. For the first time in Italy, the entirety of Gruppo T's and Gruppo N's oeuvre was sponsored by a major Italian company, which decided to present the display in one of its showrooms. Munari and Enzo Mari (1932–2020) also took part to the exhibition.[257] Olivetti's influence on the event's organization was essential for the definition and the selection of a new kind

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[255] See the cover of *Almanacco Letterario Bompiani 1962* (Milan: Bompiani, 1961).

[256] See Umberto Eco, 'La forma del disordine', *Almanacco Letterario Bompiani 1962*, pp. 175-189 (pp. 181); *Davide Boriani: Arte cinetica, programmata, interattiva*, pp. 142-149; Giovanni Rubino 'Bruno Munari versus Programmed Art: A Contradictory Situation, 1961-1967', in *Bruno Munari: The lightness of Art*, pp. 89-111 (p. 94-95).

[257] Enzo Mari was one of the most famous Italian designers. During the 1960s, he contributed to the development of the kinetic avant-garde without officially being a member of any group. Between 1963 and 1965, Mari was in charge of the organization of the third edition of the New Tendencies. During these meetings, he focused the critics' and artists' attention on the risk of the commercialization of art exhibitions and he denounced the ambiguous role of thinkers and intellectuals in the capitalistic society of the period. From 1968, he decided to decline all invitations to participate in collective exhibitions against the capitalization of art. During the first half of the 1960s, Mari contributed to the development of the concept of programming, participating in the 'Arte Programmata' exhibition both in Italy and abroad. He worked on the idea of the module and its programming, thanks to the different combinatory possibilities within the module itself. Additionally, he experimented with perceptual ambiguity through colours and volumes. See *Arte programmata e cinetica (1953-1963). L'ultima avanguardia*, ed. by Lea Vergine, pp. 105-109.

of onlooker, one interested in public exhibitions. Compared to the usual target, this audience was surely more informed in terms of scientific discoveries and technological development; at the same time, though, it was less trained in terms of artistic knowledge, as Meneguzzo has suggested. More generally, it was probably fascinated by actual design and industrial objects and it appreciated the engaging industrial aesthetics of Olivetti.[258] Each artist exhibited one work, while Eco wrote the programmatic text for the catalogue and art photographer Ugo Mulas (1928–1973) took pictures of the artworks.

The concepts of variation, kinetics, programming and chance were the *fil rouge* of the exhibition: Munari and Gruppo T mainly focused on real movement, whereas Gruppo N paid more attention to the manipulation of the observer's visual perception through the use of apparent motion.[259] Eco's catalogue text summarises what I have already described as the urgency, for the new generation of artists, 'di una rottura degli schemi percettivi'.[260] It was necessary for these new 'operatori estetici' – using a term adopted by Eco himself – to converse with the observer of the 1960s with new tools and new approaches, borrowed from the multi-stimuli society in which the new audience lived.[261] It is fundamental, in Eco's opinion, to be aware of the radical changes in terms of artistic taste and in the conception of art itself in this modern society. Artistic expressions now have a social function; in other words, they represent the perceptual dynamism of modern times. As in all the different editions of the 'Miriorama' displays, motion stimulates an active and perceptual answer by the observer, defining a new kind of relationship between the artistic object/experience and the

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[258] See Marco Meneguzzo, 'Dal cinetico al programmato: una storia italiana', *Arte Programmata e Cinetica in Italia 1958-1968*, ed. by Marco Meneguzzo, p. 37; Giovanni Rubino 'Bruno Munari versus Programmed Art: A Contradictory Situation, 1961-1967', in *Bruno Munari: The lightness of Art*, pp. 89-111 (pp. 96-7). It is worth examining whether this new type of observer was the target sought by Gruppo T and Gruppo N, that is to say, a limited public captivated by recent scientific research and by optical and visual experiments. As I have already explained, although the observer is the central focus of this research, it is very difficult to identify the type of public Arte Programmata addressed and that visited its exhibitions. The lack of reliable sources that can fully testify to the artistic experience of those who visited one of Gruppo T's or Gruppo N's exhibitions, the presence of extremely partial articles on the subject, and the public's already difficult relationship with the concept of contemporary art (which was also influenced by the irony of the media – see the Introduction section 3) are all elements to be taken into consideration. See also note 233 and 247.

[259] The critic Carlo Belloli (1922–2003), in 'Nuove direzioni della cinevisualità plastica totale. Indicazioni per un catalogo degli artisti d'oggi impegnati nell'integrazione visuale', described the differences between Gruppo T and Gruppo N in terms of artistic research; he acknowledged a general lack of novelty in the Paduan group's production, even though it made some attempts towards three-dimensionality. Whereas the Milanese group experimented more with the visual animations of structures and with three-dimensionality, Gruppo N was mainly focused on psychological aspects: 'Per quanto le loro ricerche restino ancora allo stadio della riscoperta di vecchie nozioni didattiche inerenti la psicologia della forma, nei diversi processi di trasmissione ottica delle sue possibilità combinatorie, o si limitino ad esercizi di superposizione di forme semplici con variazione degli angoli di superposizione per spostamento o rotazione, vogliamo, tuttavia, ricordare qualche risultato raggiunto da certi loro lavori, e assegnabile all'ordine della vita plastica. Biasi […] si sta ora dedicando a problemi di animazione strutturale, per partecipazione manuale dello spettatore che può dirigere segmenti cilindrici fissati in direzioni orizzontali-verticali lungo un percorso quadrato.' Carlo Belloli, 'Nuove direzioni della cinevisualità plastica totale. Indicazioni per un catalogo degli artisti d'oggi impegnati nell'integrazione visuale', *Metro*, 7 (1962), 98-113 (p.102).

[260] *Arte cinetica. Arte programmata. Opere moltiplicate. Opera aperta*, exhibition catalogue.

[261] On the term 'operatori estetici' see note 135, Chapter 1, section 1.4.

audience. The use of unstable shapes and simultaneous sensory solicitations – typical of the urban and technological environment of the 1960s – seems to allow for a more complete appreciation of the artistic experience, since people ought to be able to understand and appraise it more.[262] More generally, in Eco's text a high level of positivity is evident in the depiction of the twentieth-century onlooker and their relationship with electrical motors, kinetics and multisensory stimuli:

> Gli inventori di forme matematiche tentavano le vie della 'movimentazione' tridimensionale, costruendo strutture immobili che, viste da più prospettive, apparivano mutevoli e cangianti, o addirittura strutture mobili, 'cinetiche' […] Gli uomini del ventesimo secolo traevano piacere dalla visione, non più di una forma, ma di tante forme compresenti e simultanee, perché questo fatto non significava affatto una depravazione del gusto, ma la sua adeguazione a tutta una dinamica percettiva che le nuove condizioni tecnologiche e sociali avevano promosso. […] Quello che il critico dovrà riconoscere è che l'arte, nel ventesimo secolo, doveva tentare di proporre all'uomo la visione di più forme contemporaneamente e in divenire continuo, perché questa era la condizione a cui veniva sottomessa, a cui sarebbe stata ancora più sottomessa, la sua sensibilità […].[263]

As for Anceschi, Eco reinforces the idea that a work of art now has value only when it is activated following an established design, when people experience it according to rational and scientific criteria, and when it is possible to perceive its instability and kinetics. In the article 'La forma del disordine', the modern audience is portrayed as restless and 'forced' to develop a perceptual dynamism in order to belong to a world dominated by science and instability:

> L'uomo di Munari è costretto ad avere mille occhi, sul naso, sulla nuca, sulle spalle, sulle dita, sul sedere. E si rivolta inquieto in un mondo che lo tempesta di stimoli che lo assalgono da tutte le parti. Attraverso la saggezza programmatica delle scienze esatte si scopre abitatore inquieto di un *expanding universe*. Non dico che sia una bella storia. È la storia.[264]

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[262] In the aforementioned article, published in *il Verri* in 1959, Crispolti expresses similar concepts about the pressure of modern times when describing Gruppo T's first exhibition: the urgency now is to adapt art to reality. Crispolti's words convey the difficulty for the artistic environment of the time to keep up with the concrete situation of modern society: 'Tuttavia sarà bene sottolineare come il problema attuale non sia meramente né eminentemente morfologico, di adeguazione o di costituzione di linguaggio, bensì precipuamente di aderenza ad una realtà, alla concreta situazione dell'uomo, la quale […] impegna ad una presenza continua, ad una difficilissima aderenza, che non giungono ormai a soddisfare nemmeno i numerosi e reiterati atti di mera eversione avanguardistica (o pseudo-avanguardistica) […]'. Crispolti, 'Mostra di Anceschi, Boriani, Colombo, Devecchi. Gall. Pater, Milano, settembre 1959', p. 98.

[263] *Arte cinetica. Arte programmata. Opere moltiplicate. Opera aperta*, exhibition catalogue.

[264] Eco, 'La forma del disordine', pp. 175-189 (p. 187).

Additionally, Eco introduces another element in this analysis: the role of nature. The epistemological relationship between art, society and nature is explicit in the *Almanacco*. In his opinion, art reproduces the way humanity interprets nature through its cultural and social filters:

> Salvo che in questo caso l'arte non imita quella natura che per abitudine percettiva vediamo tutti i giorni, ma quella che concettualmente definiamo in laboratorio. E dunque, intendendo 'natura' nel solo senso corretto possibile, l'arte imita non la natura, ma il nostro modo di interpretare e definire la natura, imita il nostro rapporto operativo con la natura […].[265]

Art is, then, humanity's relationship with nature, its perception of or 'rapporto operativo' with it – an intriguing choice of terminology that Eco undoubtedly borrowed from the language of industry (i.e. the idea of operating a piece of machinery).

I will offer a more precise and in-depth analysis of the concept of programming (and therefore of the idea of chance) below (see Chapter 4), but for now it is worth examining the notions of instability, dynamism and programming. I will do so by describing some of the most famous and iconic works displayed at the Olivetti showroom for this exhibition. Anceschi's *Percorsi fluidi orizzontali* (1962) is one of the most renowned works of this pioneering exhibition. It consists of a square base resting on a square tube; at the end of the tube, a neon lamp lights up a surface of matt white glass. In front of this lit screen, a series of tubes with a mix of coloured liquid and air running through them is set horizontally and scaled in depth. The work is activated by a motor, which alternatively presses two large rubber bulbs through a set of rotating mechanisms.[266] Liquids and air bubbles thus create ever changing images in the eyes of the observer who stands in front of the intricate grid of tubes (fig. 27). The example proposed for the event is the only motorised and lit version of the series of *Percorsi fluidi* that the artist created. The earliest versions were animated by hand pressure, thanks to which a mix of coloured liquid and air started moving within small transparent tubes (fig. 28). The evolution of *Percorsi fluidi* shows Gruppo T's desire to evolve from the idea of an artwork characterized by simple mechanical and manual variations, where mechanisms were activated by levers or buttons – as with the works that I have analysed previously. Artists now seek to express themselves through electromechanical programming experiments; the use of small motors increases the kinetic feature and the art/science relationship, enforcing the idea of industrial aesthetic as the only answer to the modern observer's needs.

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[265] Ibid., p. 176.

[266] Carlo Belloli, 'Nuove direzioni della cinevisualità plastica totale. Indicazioni per un catalogo degli artisti d'oggi impegnati nell'integrazione visuale', pp. 98-113, (p. 99); *Arte cinetica. Arte programmata. Opere moltiplicate. Opera aperta*, exhibition catalogue. See also http://www.reprogrammed-art.cc/library/70/Percorsi-fluidi- [accessed 20 April 2021].

Strutturazione fluida (1960) is probably the most famous and most frequently cited artwork among those displayed during the exhibition at the Olivetti showroom. It is a transparent box holding a moving belt: a pulley hidden in the bottom part of the artwork moves the belt in a continuous way, pulling it out on one side and swallowing it in on the other side (fig. 29).[267] As a consequence, the belt forms constantly changing curves. In this work, the features of Colombo's artistic research are well expressed: he aims to give life to continuous variations and sequences, creating an object in constant evolution. The artistic object that is generated at the end of each sequence by activating the pulley is always different, giving each observer a new experience. The latter is therefore forced – while the bending belts change their shape – to look for new folds, isolating the belt from the surrounding context that passes through the transparent box holding the belt, and this can potentially distract them: it is a real perceptual workout that never seems to end.

Superficie Magnetica (1962), by Boriani, is certainly one of the most spectacular works presented at the Olivetti showroom. It consists in a large disc divided into irregular compartments made of plastic material, which contain a certain amount of iron dust. On the back of the work, magnets operated by electric motors move irregularly, dragging the metal powder and composing ever changing shapes (fig. 30). Boriani programmed sequences of variable movements of the magnets; the dust, instead, formed progressively different and unpredictable agglomerates due to the magnets' action. The non-programmable action of the powder represents the random element of the artistic experience that attracts the observer and pushes them to extend their time of observation (fig. 31).[268] Like Anceschi's *Percorsi fluidi*, the *Superficie magnetica* on display at the Olivetti showroom was the result of an evolution from the study of purely mechanical objects to more complex, electromechanical and electromagnetic structures. The *Superficie Magnetica No. 6* of 1959, for example, contained a horizontal wood surface, iron powder and magnets, but without the observers it could not work; it is, in fact, the onlookers' moving of two handles that triggers the variation of the iron powder aggregations.[269] Similarly, other magnetic surface designs created between 1959 and 1962 were programmed to act following the observer's direct physical interaction with the object. Hence, simultaneously with an increase in the electromechanical features of Gruppo T's works, a

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[267] In an interview with Jole de Sanna, Colombo declared that he drew the inspiration for the curvilinear and sinuous forms that characterize the work *Strutturazione fluida* from the production of the German-French artist, Jean Arp (1886–1966). Colombo's aim was to make the organic forms that characterise Arp's work mutable and ever changing. Colombo was principally interested in the perceptual potential, flexibility and tension of the organic shapes created by Arp. See Jole de Sanna, 'Storia come filtro della qualità. Intervista a Gianni Colombo', in *I Colombo: Joe Colombo (1930-1971), Gianni Colombo (1937-1993)*, ed. by Vittorio Fagone (Milan: Mazzotta, 1995), pp. 289-301 (pp. 294-5). For more information about Arp see Eric Robertson, *Arp: Painter, Poet, Sculptor* (London: Yale University Press, 2016).

[268] *Arte cinetica. Arte programmata. Opere moltiplicate. Opera aperta*, exhibition catalogue. See also *Davide Boriani: Arte cinetica, programmata, interattiva*, pp. 152-3 and p. 164.

[269] *Davide Boriani: Arte cinetica, programmata, interattiva*, p. 25.

change occurred in the object's interaction with the visitor, the artwork becoming more focused on visual, perceptual engagement and less on multisensory and tactile engagement.

It is useful to make a comparison with Gruppo N, which did not include any electronically animated objects in the exhibition at the Olivetti showroom. Instead, it limited itself to projects whose kinetic features were apparent (i.e. evoked by a perceptual illusion) or purely mechanical and manual. One example of illusory kinetics is *Visione dinamica*, a project Toni Costa created in 1962 (fig. 32). On a square black surface with a wooden frame, thin strips of PVC plates are stretched from one side to the other with a twist until they cover the entire surface. In the areas where the creases add up, the black space below can be seen. From the observer's point of view, the geometric shape of the black space changes in relation to the observer's position.[270] Gruppo N's research has a purely Gestalt nature,[271] focused on perceptual configuration studies; thanks to the viewers, new perceptual phenomena are created that make it possible to study the behaviours and thought processes leading to perception.[272] Furthermore, by moving towards the work in an ever different way, the observers bring an element of subjectivity into the artistic experience. As already noted above, the experimental approach unites both groups while the aspect that clearly differentiates one group from another is the focus on the concept of kinetics and fluidity: even for mechanical works, this concept has no relevance for Gruppo N as it has, instead, for the members of Gruppo T.

The 'Arte Programmata' exhibition attracted the attention of critics and the press. Between 1962 and 1964, the project moved to Venice,[273] Rome, Trieste, Düsseldorf and London, with the inclusion of five works from the French Groupe de Recherche d'Art Visuel (called G.R.A.V.) and with the participation of Getulio Alviani (1939–2018).[274] The Friulian artist is known for having

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[270] *Arte cinetica. Arte programmata. Opere moltiplicate. Opera aperta*, exhibition catalogue.

[271] 'Gestalt' psychology refers to a holistic approach to the study of the mind and human behaviour that is opposed to a compartmentalized and sectorial approach ('Gestalt' is German for 'form' or 'shape'). Ever since the beginning of the twentieth century, it has been applied to a body of scientific principles that were derived mainly from experiments in sensory perception. Gestalt theory is concerned with formal organization, with the tendency of the mind to shape and structure experience. Natural phenomena and artistic experiences are not described adequately if they are analysed piece by piece; the appearance of an element depends on its place and function in an overall pattern. Based on Gestalt theory, vision is not a mechanical recording of elements, but the apprehension of significant structural patterns. The artistic representation of an object can therefore no longer be viewed as a transcription of its accidental appearance, detail by detail. See Giulio Carlo Argan, 'La ricerca gestaltica', *Il Messaggero*, 24 August 1963. p. 3 and Rudolf Arnheim, *Art and Visual Perception: A Psicology of the Creative Eye* (Berkeley, Los Angeles, London: University of California Press, 1974).

[272] *Programmare l'arte: Olivetti e le neoavanguardie cinetiche*, ed. by Marco Meneguzzo, Enrico Morteo, Alberto Saibene, p. 69; Carlo Belloli, 'Nuove direzioni della cinevisualità plastica totale. Indicazioni per un catalogo degli artisti d'oggi impegnati nell'integrazione visuale', pp. 98-113, (p. 102).

[273] See *Azimut/h continuità e nuovo*, ed. by Luca Massimo Barbero (Padua: Marsilio Editori, 2014), pp. 584-604 for a reproduction of the exhibition brochure of the Venetian event. The Milanese catalogue was substituted so as to add Alviani's and G.R.A.V.'s works.

[274] The 'Arte Programmata' exhibition was displayed in different Olivetti showrooms throughout Italy: Galleria Vittorio Emanuele, Milan (May 1962); San Marco Square, Venice (July–August 1962), Barberini Square, Rome (October 1962); Galleria La Cavana, Trieste (December 1962–January 1963). Abroad it was shown in Düsseldorf, at the Galerie Goppinger in 1963, and at the Royal College of Art in London, in 1964. Even though the majority of the consulted texts report the presence of the G.R.A.V. group, the catalogue titled *GRAV (Groupe De Recherche d'Art Visuel): Stratégies De*

exhibited a surface made from aluminium sheets that, due to their alternating orientations, create ever changing shapes due to different lights and angles of vision.[275] Compared to the artists of Gruppo T, whose idea of programming implied – in this phase and in the majority of cases – the creation of artworks characterised by controlled movements through the use of electrical motors, and to those of Gruppo N, who stressed manual interactions and apparent kinetics, Alviani's work was characterised by a limited influence of the programming activity, whether it aimed to develop the observer's perceptual reaction or to study the variation between coded instructions and chance.[276]

The G.R.A.V. group, whose participation in the Arte Programmata events was strongly supported by Munari, participated in the exhibition with Julio Le Parc (1928), Joël Stein (1926–2012), Jean-Pierre Yvaral (1934–2002), Francisco Sobrino (1932–2014) and Francois Morellet (1926–2016).[277] If we analyse its *Propositions sur le movement* [*Proposals about the movement*], dated January 1961, a strong relationship between the programmatic theories of the Italian groups and those of the G.R.A.V. becomes evident.[278] As for the Italian artists, the G.R.A.V.'s members privileged group work compared to single artistic experiences, favoured a rational conception of the work of art, and focused their research on perceptual studies. As was also the case for Gruppo T, the G.R.A.V.'s artists developed an interest in the instability of the artwork by promoting the role of kinetics as the right approach to objectify the space–time relationship.[279] Furthermore, it is evident from their

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Participation, 1960-1968 does not confirm any involvement of the G.R.A.V. members once the exhibition had left Italy. See *GRAV (Groupe De Recherche d'Art Visuel): Stratégies De Participation, 1960-1968*, ed. by Yves Aupetitallot, Frank Popper, Marion Hohlfeldt (Grenoble: Magasin-Centre national d'art contemporain, 1998), p. 95. Nevertheless, sources confirm the presence of Mari and Alviani for both the other Italian and the European stages of the exhibition.

[275] *Azimut/h continuità e nuovo*, ed. by Luca Massimo Barbero, p. 588.

[276] Alviani in an interviewed with Meneguzzo of 1995: 'Munari storceva un po' il naso perché nelle mie opere non c'erano motori, e quindi non si potevano programmare […] Programmazione per me non consisteva nel programmare un oggetto, ma un lavoro: come organizzarlo, come produrre. In senso costruttivo, programmazione dell'opera era trarre da un modulo il maggiore numero di varianti possibili, da una forma base ottenere risultati innumerevoli […]. *Programmare l'arte: Olivetti e le neoavanguardie cinetiche*, ed. by Marco Meneguzzo, Enrico Morteo, Alberto Saibene, p. 123.

[277] In a letter published by Meneguzzo in *Programmare l'arte: Olivetti e le neoavanguardie cinetiche*, Munari encouraged Gruppo N to contact the G.R.A.V. group because they both shared the same interests and research projects: 'A Parigi c'è un "gruppo di ricerca d'arte visiva" rue beautreillis 9 mettetevi in contatto, scrivete a Le Parc e fatevi mandare qualche loro stampato. Hanno un programma molto chiaro'. Ibid., p. 13.

[278]. The leaflet with the G.R.A.V. proposal was published with the help of Galerie Denise René, but not until 5 May 1961: '[…] Nos expériences peuvent avoir encore une apparence traditionnelle – peinture, sculpture, reliefs – pourtant nous ne plaçons pas la réalité plastique dans la réalisation ou dans l'émotion mais dans la relation constante existant entre l'objet plastique et l'œil humain. Le problème du mouvement a été envisagé sous différents aspects […] L'idée de mouvement présuppose l'idée de temps. Avec le mouvement l'objet plastique quitte le plan spatial pour un plan spatio-temporel. La perception de ces phénomènes s'en trouve déplacée et nous pouvons établir la relation image-mouvement-temps'. See *GRAV (Groupe De Recherche d'Art Visuel): Stratégies De Participation, 1960-1968*, ed. by Yves Aupetitallot, Frank Popper, Marion Hohlfeldt, pp. 66-67.

[279] The very title of one of their 1962 exhibitions, 'L'Instabilité', clearly conveys the ideas of 'process', 'motion' and 'becoming'. The French group and the Gruppo N collaborated on more than one occasion, and they were most active in the meetings related to the organization of 'nova tendencija 2' in 1963. See Jerko Denegri, 'The conditions and circumstances that preceded the mounting of the first two New Tendencies Exhibitions in Zagreb 1961-1963', in *A little-know story about a movement, a magazine, and the computers arrival in art: new tendencies and bit international, 1961-1973*, ed. by Margit Rosen, pp. 19-26 (21). Furthermore, G.R.A.V. organized an exhibition at Gruppo N's gallery in Padua, between 12 and 26 May 1962. See *Stratégies de participation – 1960-1968: Groupe de Recherche d'Art Visuel (GRAV)*, p. 93. From 9 to 20 June, G.R.A.V. exhibited in another important location for programmed artists: the Danish

proposals that they considered the observer's role an active element of the artistic experience; indeed, the perceptual relationship between the observer's eye and the artistic object is what they focus their efforts on most. Although the French group nurtured more intense contacts with the Paduan kinetic group, it mostly resembled Gruppo T, especially from a programmatic and theoretical point of view. Le Parc, during an intervention published in the form of a brochure in September 1962, underlines the importance of a careful conception and programming of the artwork so that it can be rational and exact, although it is, at the same time, an indefinite work, expressing itself in an instable and becoming situation. In this way, the artwork fully manifests its essence and meaning in the fluidity of space–time and thus triggers the observer's active participation:

> Du point de vue de la conception, la notion de programmation […] englobe la façon de concevoir, réalizer et présenter des œuvres instables. Il s'agit de prévoir à l'avance toutes conditions de déroulement de l'œuvre, determiner avec clarté ses modalités pour pouvoir la laisser se réaliser dans l'espace et le temps, […] et de la participation active ou active du spectateur.[280]

Nevertheless, in the French group's numerous programmatic texts no precise reference is made to the role that chance played, instead, in the production of the Italian groups, especially Gruppo T, which focused more on real kinetics. As I will observe below, through Eco's words and with the help of Bense's theories, the idea of chance in fact plays a crucial role in defining, theoretically, the concept of programming and framing its peculiarities compared to the general idea of kinetic experiments of the same period. Hence, although most of the works that G.R.A.V. presented for the Italian stages of the 'Arte Programmata' exhibition foresaw a contribution from the observer that would lead to subjective and random evolutions, and regardless of the fact that these elements of randomness could derive from an initial, programmed aesthetic situation, there is no strong evidence of any presence of the concept of chance in the G.R.A.V.'s writings.

The fact that all these different kinds of artworks were featured in the Olivetti sponsored exhibition programme is crucial because it reflects a less rigid limitation of the conception of programming (especially in view of Alviani's presence) and, at the same time, a hypothetical confusion among critics and artists about the real function and meaning of those art theories and how to apply them coherently. This uncertainty underscored the contradictory essence of the Arte Programmata movement and its inability to clearly communicate its programmatic intentions.

Gallery in Milan. See *Programmare l'arte: Olivetti e le neoavanguardie cinetiche*, ed. by Marco Meneguzzo, Enrico Morteo, Alberto Saibene, p. 31.
[280] *GRAV (Groupe De Recherche d'Art Visuel): Stratégies De Participation, 1960-1968*, p. 99.

Thanks to the collaboration between Olivetti and the Smithsonian Institute, between July 1964 and the middle of 1965 the travelling exhibition was hosted in the United States in ten different cities, with a new name: 'Arte Programmata. Kinetic Art'.[281] Every artist was allowed to show three artworks. The event's brochure was published with a personal statement from Munari about the role of Arte Programmata.[282] In this declaration, Munari expressed the importance of combining the artist's creative freedom in the artistic process and the use of 'buone forme' to shape objects with the use of technology and unconventional materials:

> The 'programming' of these works, which necessarily because of technical reasons and limitations are neither paintings nor sculpture, is to be understood in the sense that each artist chooses a particular material and the structural, kinetic, and optical combinations that he considers most suitable for the embodiment of his artistic intuition. Consequently, in keeping with the rules of 'good design' […] the object he makes will have its most natural form.[283]

The passage above reflects Munari's awareness of the uniqueness of the Italian developments in the studies of motion in art. Nevertheless, his words also reveal the acknowledgement that it is difficult to clearly define those provocations, which summarise the rigor of the scientific experiment and the need to communicate a message of dynamism through programming influencing the observer from a perceptual point of view. Moreover, the communication of such important aesthetic messages has to pass – according to Munari – through the shapes of a well-structured, attractive object, one that is effective and functional in transmitting the message that the artist has set out to communicate through their artwork. Munari's idea of Arte Programmata exported to the United States is even clearer if we read his intervention in *The Times Literary Supplement* of 3 September 1964.[284] Here, the Milanese artist enhances the communicative purpose and approach that the Italian groups adopted in their works (and by Munari himself in his kinetic-programmed production), and the importance of a 'good design' for a correct visual interaction with the observer. The object is therefore an external, engaging and functional envelope that conveys the artist's message as defined through the programming activity. As I have stated previously, the importance of the artwork's uniqueness is therefore

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[281] On the American exhibition tour and the specific location see Giovanni Rubino 'Bruno Munari versus Programmed Art: A Contradictory Situation, 1961-1967', in *Bruno Munari: The lightness of Art*, pp. 89-111 (pp. 109-110, note 35).

[282] In the brochure for the American tour no reference is made to the presence of Mari and Alviani.

[283] Bruno Munari, Riccardo Musatti, Arte programmata. Kinetic Art (Milan: Officina d'Arte Grafica A. Lucini, 1964), exhibition brochure. Organized and sponsored by the Olivetti Company and circulated by the Smithsonian Institution, printed in 1964. See *A little-know story about a movement, a magazine, and the computers arrival in art: new tendencies and bit international, 1961-1973*, p. 176. For a complete reproduction of the American tour's exhibition brochure see http://www.reprogrammed-art.cc/library/113/Arte-programmata.-The-exhibition-in-US [accessed 29 April 2021].

[284] Giovanni Rubino 'Bruno Munari versus Programmed Art: A Contradictory Situation, 1961-1967', in *Bruno Munari: The lightness of Art*, pp. 89-111 (p. 101).

sidelined. Arte Programmata should, then, rely on a new approach that the flourishing Italian design industry of those years had made its own. That is the idea of a replicable, highly functional product that was easy to interact with:

> A work of programmed art demands an actual programme of its own, consisting first of all in the exact establishment of the message to be communicated and in the choice of means of expression, uninfluenced by aesthetic, anti-aesthetic or stylistic preconceptions […] Finally comes what we may call 'good design', i.e., the projection of the object, the apparatus itself or its container. The aim here is to construct an object capable of communicating visually the intuitively-perceived kinetic message. Often the object is a natural incorporation of the same idea (as good design demands); at other and times it is a neutral container.[285]

This reference to the idea of 'good design' can probably be linked to the early stages of the 'Arte Programmata' exhibitions, when artworks were still typified by artisanal methods and limited technological features.[286] Munari's vision therefore refers to the products that can be dated, chronologically, prior to the American experience. In the United States, in fact, the Arte Programmata creations appeared profoundly improved from a technological viewpoint, promoting the image of an over-defined, high-tech artistic movement.[287] The sites selected for the exhibitions were all university galleries,[288] a choice that further stressed the idea of an experimental, interdisciplinary and avant-garde kind of art that – thanks to the locations in which it was shown – exemplified a real model of edutainment. In other words, the Arte Programmata's educational feature was symbolized by the locations that hosted the events, which enhanced the peculiarity of a movement that aimed to include a communicative element in its way of working. At the same time, the event seemed to target a delimited and not well-defined audience; as I have already stated with regard to the new kind of audience that was linked to the scientific and technological environment of the Olivetti brand, we

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[285] Bruno Munari, 'Programmed Art', *The Times Literary Supplement*, 3 September 1964, p. 793.

[286] With regard to the evolution of programmed artworks and the progressive departure from their artisan phase, the series *Trame* by Biasi (1959) and *Cartoni Ondulati* by Massironi (1959) may exemplify the idea of craftsmanship and the application of the concept of readymade. While the former was created with the help of silkworm racks, the latter was made from real cardboard. By means of simple and commonly used materials, the two members of Gruppo N focused on the psychological analysis of a shape and on visual perception through reticular visual structures. See *Arte programmata e cinetica: da Munari a Biasi a Colombo e...*, ed. by Giovanni Granzotto and Mariastella Margozzi (Rome: Il Cigno GG Edizioni, 2012), p. 19 and *Alberto Biasi: opere dal 1959 2013*, ed. by Marco Meneguzzo, pp. 19-23. For a more comprehensive look at Biasi's works, with a focus on his production of *environments* and the artistic process that led Biasi to their production see *Alberto Biasi: Gli ambienti*, ed. by Guido Bartorelli (Padua: Industrie Grafiche Peruzzo Mestrino, 2016).

[287] Giovanni Rubino 'Bruno Munari versus Programmed Art: A Contradictory Situation, 1961-1967', in *Bruno Munari: The lightness of Art*, pp. 89-111 (pp. 100-103).

[288] Marco Meneguzzo, 'Dal cinetico al programmato: una storia italiana', *Arte Programmata e Cinetica in Italia 1958-1968*, ed. by Marco Meneguzzo, p. 36.

should ask ourselves whether the limited number of scholars and experts interested in the exhibitions were the real recipients or not.[289] As anticipated in the introduction (section 3), it is evident the inability to understand if the artists' goal was to involve a specialized audience or not: this choice of location seems to go astray from their aim to stimulate the interest of a vast public.

A number of examples can demonstrate the increased use of technology in the works presented for the American tour. The most noteworthy works are those in which the artists focused on movement using lights and motors in three-dimensional structures.[290] *PH Scope* is a generator of programmed sequences of luminous images in continuous transformation (fig. 33 and 34). Through two perforated rotating disks, a source of UV light projects a series of moving points on a rotating screen. The screen, treated with phosphorescent material, transforms the UV light into visible light; in this way, the UV light's mobile points appear as persistent luminous trails that overlap and progressively disappear. The shape of the luminous trails is programmed, based on the design of the perforation, the speed and the direction of the screen and disk rotation. Nevertheless, by means of buttons placed at the basis of the *PH Scope*, the viewer can programme seven different animated sequences as well as change the direction and the speed of rotation of the mobile elements. For each *PH Scope*, then, seven different combinations are possible, which correspond with seven different basic programmes of different images. This set of programmes, whose duration and periodicity are chosen by the viewer, constitutes a sequence of unlimited duration.[291] The artist programmes the light sequences, while the combinations of each sequence are decided by the observer, who is personally responsible for the time feature of the artistic experience. The programming of the work's functioning is indissolubly merged with the chance factor related to the viewer's subjective choices. It is also possible to assume that, in order to modify the sequences, the observer approached and moved away from the work to press the buttons and to observe the screen, making the space around them – that is, the space linked to the artistic experience – fluid and ever changing.

Another work that exemplifies this evolution towards a greater technologization of programmed artworks to the detriment of previous artisanal features is Anceschi's *Struttura tricroma* (fig. 35). This project is based on a combination of light sources. Three separate light bulbs are placed behind a wooden diaphragm with three holes inside a cube structure; each hole is covered with a coloured jelly in the three basic additive colours (red, green, blue) whose mixture would generate white light in the central area. At the centre of the diaphragm, a motor moves a cross-shaped blade, whereas a perforated metallic sheet with round holes arranged on a triangular grid is set over the

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[289] For this reflection see also note 258.

[290] Presenting Gruppo T's production, the critic and art historian Frank Popper (1918–2020) wrote that Gruppo T's works were characterized by 'striking combinations of light and movement in three-dimensional framework'. See Frank Popper, *Origins and development of Kinetic Art*, p. 178.

[291] *Davide Boriani: Arte cinetica, programmata, interattiva*, pp. 222-235.

blade. A translucent screen closes the cube a few centimetres above the sheet. The effect of chromatic transformation is highly refined since the cross-shaped blade is placed between the light sources and the screen, alternately covering one or the other light source, thus producing different chromatic nuances. The cubic modules can be piled up to four.[292] As with *Percorsi fluidi*, Anceschi does not seek the observers' physical interaction, but their perceptual engagement. In fact, the continuous and incessant movement of the blades lead the observers to be displaced by the speed, being blurred by the perception of the different colours. However, the artist takes the experiment a step further: if with *Percorsi fluidi* Anceschi focused on the research and production of images in programmed variation, he now focuses on the perceptual aspects of scientific phenomena in programmed variation.[293]

Perhaps the choice of opting for more complex, eye-catching and effective structures – by increasing the use of lights and electronics – is particularly evident if we consider Gruppo N's production. Far more concentrated on apparent kinetics and optical illusions, some of its members opted for provocations that were characterized by light effects and the use of small motors for their American tour. It is worth mentioning Biasi's *Light prisms*, the only series of works created by the artist (whose initial design is dated 1962) that involves the use of a motorized kinetics (fig. 36). The movement is indispensable in allowing the rebounding of the visible spectrum, divided by the first prism that rotates on the others in order to obtain unpredictable refraction phenomena, given the combination of different speeds with different directions of the light spectrum.[294] The observer's eye is thus stimulated to move incessantly across the work so as to follow the evolution of the light refractions. The artist has programmed the work in a way that makes the trajectories unpredictable and the observer highly involved.

Arte Programmata started to enjoy a vast commercial success, increasing its fame throughout the United States; while its tendency to conduct pure research and its interdisciplinary core decreased, its commercial attractiveness rose.[295] The Italian artists had always rejected and avoided the movement's commercial value because it was in stark contrast with the artwork's principles of democracy and rationality, but also because they firmly opposed the cult of the artist's personality, instead emphasizing the ideal of teamwork, encouraging the regular exchange of knowledge and promoting a social unit of action.[296] Of the two groups, the Paduan group paid particular attention to anonymity. When presented on the brochures of the various 'Arte Programmata' exhibitions, their

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[292] http://www.reprogrammed-art.cc/library/29/Struttura-tricroma- [accessed 28 April 2021].
[293] *Arte programmata e cinetica (1953-1963). L'ultima avanguardia*, ed. by Lea Vergine, p. 74.
[294] *Alberto Biasi: opere dal 1959 2013*, ed. by Marco Meneguzzo, pp. 46-53.
[295] Giovanni Rubino 'Bruno Munari versus Programmed Art: A Contradictory Situation, 1961-1967', in *Bruno Munari: The lightness of Art*, pp. 89-111 (p. 101-102).
[296] Margit Rosen, 'The art of programming: the new tendencies and the arrival of the computer as a means of artistic research', pp. 27-41 (p. 28).

works were attributed exclusively to the 'Gruppo N', and they thus avoided specifying any stylistic differences between the members. As Mari stated during his interview with Meneguzzo in 1995, the artist's active role in the art market was in strong contrast with the idea of an artwork that could be shared equally by everyone:

> Pensavo al rifiuto dei rapporti fra l'artista e il mercato, ma soprattutto la cultura di sinistra permeava tutti […] negazione del mercato dell'arte; oggettivizzazione dell'opera; approccio di natura scientifica ai problemi. Da questo derivavano: il rifiuto della firma; la negazione della 'maniera' soggettiva.[297]

Massironi, during his interview with Meneguzzo, stressed the same topic, focusing on the group's scientific and democratic approach; once the artist created a new prototype, it became a common heritage of humanity.[298]

Gradually the works of Gruppo T and Gruppo N started to be included in more general categories such as kinetic art or Optical Art, which comprised stylistically different artists who worked on motion. While the art movement underwent an evolution that could be defined as 'pop', thanks to its affiliation with Op Art, art historian Giovanni Rubino points out how 'reviewers also seemed to wonder whether the works on display counted as art or science', highlighting once again the difficulty on the part of the public and critics to fully understand the nature and purpose of these groups of experimental artists.[299] The generalisation and the confusion created by the inclusion in other artistic groups generated a broad misunderstanding about the purposes of the artists' research: the Italian movement was confused with the pure and simple, decorative style that characterised Op Art, losing its peculiarity.[300] This radical passage from university galleries to international recognition

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[297] *Programmare l'arte: Olivetti e le neoavanguardie cinetiche*, ed. by Marco Meneguzzo, Enrico Morteo, Alberto Saibene, pp. 132-133.

[298] 'All'inizio eravamo molto decisi a dichiarare che la realizzazione di un oggetto non era che la realizzazione di un prototipo che chiunque avrebbe potuto poi rifarsi'. Ibid., p. 136.

[299] Giovanni Rubino 'Bruno Munari versus Programmed Art: A Contradictory Situation, 1961-1967', in *Bruno Munari: The lightness of Art*, pp. 89-111 (p. 102-103).

[300] Menna defines the concept of Op Art as a simple optic effect with an end in itself. The awareness of the identity confusion experienced by the Arte Programmata movement seems evident in his words. Menna compares Optical Art to mass media, because both of them are passively experienced by the observers. There is neither aesthetic potentiality nor research in Op Art: it's just a play of optical illusions. Furthermore, what is important to underline in his text is the reference to the didactic, operational and proactive value of the programmed sequences that characterize the artworks of the Italian groups. 'Gli artisti italiani che operano nell'ambito delle ricerche cinetiche e visuali si distinguono innanzitutto per la consapevolezza critica che essi hanno di questi problemi e per la volontà di impostare il proprio lavoro su basi sperimentali al di fuori delle suggestioni della moda e delle lusinghe del mercato. Da questo punto di vista, la loro attività deve essere tenuta ben distinta dalla inflazione della cosiddetta "op art" […] ma non è difficile constatare che nel fenomeno "op" si verifica uno sfruttamento più o meno abile di effetti ottici in cui i dati della visione sono assunti passivamente più che essere verificati nelle loro potenzialità estetiche, mentre nelle ricerche autenticamente sperimentali la visione è interpretata come un principio formativo ed è quindi assunta non come qualcosa di *dato*, ma come *valore*'. Filiberto Menna, 'Situazione delle esperienze cinetiche e visuali in Italia', pp. 104-114, (p. 108).

is exemplified by the first blockbuster exhibition, 'The Responsive Eye', which took place at the MoMa in New York, from 23 February to 25 April 1965; it included all the current international experiments with perceptions from different viewpoints and approaches.[301] Given the generic nature of the exhibition, which comprised very different experiences related to kinetic art, it is considered a real symbol of the 1960s. Compared to Gruppo T, which did not contribute to the event, Gruppo N's works were certainly more in line with the curatorial choices of the exhibition. In the catalogue, in fact, it says the following:

> Although certain works in this exhibition include elements hung from above involving slight internal motion, fully kinetic sculpture is not shown. Perceptual viability, not physical movement is at issue whether it results from internal variation or change in viewpoint. Nevertheless the most real and important distinction that separates reliefs from paintings is the incorporation of spectator movement. […] The intent of the *Responsive Eye* surely clear by now, is to dramatize the power of static forms and colours to stimulate dynamic psychological responses. […].[302]

It is clear, then, that the curatorial choices of the event did not consider the real motion in artworks, but preferred to focus on perceptual variations and movements. This led to a great percentage of artworks that were not three-dimensional structures, but which simply hung on the walls. Although the perceptual relativism was undoubtedly engaging for the onlookers, who interacted with the works as demonstrated by videos of the event,[303] compared to some of the experiences offered by Gruppo T in those same years the observer could not move around the artwork as much, nor could they enjoy the multisensory experiences and explorations of some of the most avant-garde pieces created by the Milanese group.

2.3 Developing the Idea of Programming: The Biennale and the End of a Short but Intense Exhibiting Experience

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[301] Giovanni Rubino 'Bruno Munari versus Programmed Art: A Contradictory Situation, 1961-1967', in *Bruno Munari: The lightness of Art*, pp. 89-111 (p. 102-103); Margit Rosen, 'The art of programming: the new tendencies and the arrival of the computer as a means of artistic research', pp. 27-41 (p. 27).

[302] *The Responsive Eye*, ed. by William C. Seitz (New York: The Museum of Modern Art, 1965), pp. 41-42.

[303] *The Responsive Eye* documentary, 1966: https://www.youtube.com/watch?v=ek_lQJsU41U [accessed 1 May 2021]. The interviewed people confirmed (in most cases) that they were very intrigued and amused by the experience: they witnessed something new that interested them very much. Some, after the visit, complained about a certain fatigue linked to the 'perceptual gymnastics' that they underwent, but, in general, visitors found the experience stimulating.

In 1964, Gruppo T and Gruppo N took part in the 'XXXII Biennale' of Venice. The critic Maurizio Calvesi (1927–2020) wrote the introduction to the Italian rooms, focusing on the presence of the Arte Programmata groups.[304] In Calvesi's text, emphasis is placed on some of the aspects I have discussed thus far and which can help to frame the concept of programming. In particular, the accent is placed on the instability evoked by the displayed works and on the importance of the geometric element, considered as the basis of the complex structure of the artwork that will come to life through programming. The artwork is subject to a careful and rational planning process that deprives it of the artist's subjective feature: it is a hypothesis, which can be verified only through the observer's direct interaction with the object. These artworks are therefore unstable, incomplete and fluid projects. As the collective exhibition 'Miriorama 8' and Dorfles's words in *il Verri* have already highlighted, the programmed objects are – in Calvesi's opinion – directly inspired by industrial design; he only sees this proximity in the use of the material, judging the works of the N and T groups as nonfunctional, and generally as only experimental at a perceptual and optical level. This explanation heightens the feeling that the revolution these artists proposed was not fully understood or lacked the necessary development to be defined more precisely:

> Ora, questo sforzo di 'integrazione estetica' nell'ambito della progettazione e della produzione è stato già largamente tentato attraverso lo *industrial design*; ma mentre il disegno industriale progetta funzionalmente dati oggetti dai connotati pratici, le ricerche 'ghestaltiche' assumono un carattere soltanto genericamente e potenzialmente di progettazione […] e quando si servono di materiali industriali se ne servono, tutt'al più, a titolo esemplificativo, sperimentale, ma mai perentoriamente strumentale.[305]

In Calvesi's opinion, however, one thing appears certain: it is useless to ask ourselves whether these experiments are paintings or sculptures, as they have 'un carattere di autonomia estetica che le qualifica come opere d'arte'.[306]

Gruppo N presented 15 works in Venice, most of them called *Visione dinamica*, *Struttura ottico-dinamica* and *Cino-reticolo spettrale*: four pieces in this wide selection were characterized by

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[304] *XXXII Biennale internazionale d'arte: Venezia, 20 giugno -18 ottobre 1964*, ed. by Umbro Apollonio (Venice: Stamperia di Venezia, 1964), pp. 137-8.
[305] Ibid., p. 137.
[306] Ibid., p. 138.

real kinetics, thanks to the use of an electromotor.[307] The critic's description of the presence of Gruppo N at the event can help explain the chosen titles: 'il gruppo N ricerca effetti ottici e di spazialità dinamica in relazione, specie, alla mobilità fenomenica della luce'.[308] In another room, Gruppo T presented two works for each artist.[309] The creations were extremely varied in the methodologies and techniques used. Compared to Gruppo T's works for the Italian stages of the 'Arte programmata' exhibition, many of the objects that the Milanese group showed in Venice implied not only the observer's active participation in terms of perceptual stimulations, programming of interactions and development of an emotional component, but also a very important physical interaction with the surrounding space. Works such as *Strutturazione cilindrica virtuale* by Anceschi, *Ipercubo* by Boriani and *Strutturazione acentrica* by Colombo reflect an evolution in the production of Arte Programmata. In the past, and especially during the 'Arte Programmata' exhibition, the movement's works had mostly been experienced frontally, particularly artworks such as Boriani's *Superficie magnetica* or *Percorsi fluidi orizzontali* by Giovanni Anceschi. However, it appears evident that the artists were interested in an all-round involvement.[310] This stylistic choice can be compared to the choice made for 'Miriorama 8': the programmed artworks are simply objects, experiments that must be conducted without there being any physical resistance or barrier between the work of art and the public. Moreover, the works clearly proceed towards the production of a real *environment*, where the fusion between time, space and the audience's involvement is complete. An object, then, can be 'experienced' totally, at 360 degrees. This stylistic evolution is understandable if we also consider the fact that, in the same year of the Biennale, Boriani, Anceschi, Devecchi and Colombo individually (i.e. not as Gruppo T members) conceived and developed the first *environments*, where the rules were defined by programming the observer's multisensory, playful and complete interaction.[311] The observers could deal with an inhabitable artistic experience that provokes them by questioning their perceptive abilities and their balance, alienating them and challenging their canonical space–time references.[312]

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[307] The Biennale catalogue presents some inaccuracies with regard to the exact number of Gruppo N works on display. Furthermore, Chiggio's participation is not mentioned even if he took part in the event. See Marta Previti, 'Il Gruppo N alla XXXII Biennale d'arte di Venezia', *Padova e il suo territorio*, 205 (2020), 41-44 (p. 42).

[308] *XXXII Biennale internazionale d'arte: Venezia, 20 giugno -18 ottobre 1964*, ed. by Umbro Apollonio, p. 138. Although both groups presented themselves as collective organizations in the Biennale catalogue, Gruppo T specified who the author of each artwork was, whereas Group N decided not to add this detail: each work of art was the result of the group's creativity. The same choice was made for the American tour brochure.

[309] Mari and Alviani were present in the event and they displayed their works in the same room.

[310] Munari's works *Nove sfere in colonna*, exhibited after the first 'Arte Programmata' show, already represented an example of this concept in 1962.

[311] The first *environments* by Boriani, Anceschi, Devecchi and Colombo were projected during the 'Nouvelle Tendence' exhibition that took place in Paris in 1964.

[312] *Gli ambienti del Gruppo T: Arte immersiva e interattiva*, ed. by Lucilla Meloni (Milan: Silvana Editoriale, 2004), pp.137-140.

Anceschi's *Strutturazione cilindrica virtuale* (fig. 37) focuses on the perceptual aspect of phenomena in programmed variation and on the concept of the perceptual threshold.[313] The work consists of a horizontal square board with nine pairs of metal rods, varnished in black with white stripes. The rods, rotating at a high speed, generate nine cylinders. A program regulating the speed makes the cylinders appear and disappear. In the transition between the two statuses of the virtual volume, the cylinders reach a lower speed that produces an effect of perceptual instability in the observer.[314] The *Ipercubo* by Boriani (fig. 38) is composed of a series of five concentric cubes whose measures are in a relationship of 1/root of 3. It is a space modulator in four dimensions, following a concentric structure, and it is formed by a series of modular elements in movement. Each element consists of a spatial structure and a temporal value: the cube volume and its rotation speed. The speed of rotation is inversely proportional to the dimension of each cube, whose number can grow indefinitely. For the observer, who inhabits the object psychologically, this dynamic organisation of space becomes perceptible in a centrifugal sense for its mostly static spatial characteristic and for the progressive increase – in a centripetal sense – of its dynamic characteristics of topological instability.[315] Like Anceschi's work, Boriani's machine reflects an attempt to alienate the observer and confuse their perceptual, spatial and temporal certainties. The work has its own stability and mobility at the same time, incorporating in itself different tempos and rhythms. Although a reference to Munari's *Macchine Inutili* is inevitable, given the hanging object that occupies a vast space surrounding the observer, in that case there was no programming in the kinetic sequences of his machine; in Boriani's work, instead, we are witnessing a detailed planning of its operation.

Strutturazione acentrica by Colombo (fig. 39) is composed of two cylinders characterized by 'unità alveolari, costituite da un reticolo spaziale di alveoli che si espandono orizzontalmente in modo parallelo e verticalmente a sviluppo elicoidale'.[316] The viewer's eye therefore incessantly chases the ups and downs of the perspective void that crosses the two vertical cylinders in torsion. Light plays a crucial role in this work, because it presents the observer with unstable objects whose outlines and shapes are impossible to define clearly, given their continuous movement.

To consider the importance of the Arte Programmata movement in the 1960s from an international viewpoint it is necessary to briefly summarize other exhibitions in which both Gruppo T and Gruppo N participated. One of these was the 'IV Biennale d'Arte di San Marino' that took place between June and October 1963, organized by the eminent art historians Argan, Restany, and Vicente Aguilera Cerni (1920–2005). The event was attended by more than 200 artists from over

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[313] *Arte programmata e cinetica (1953-1963). L'ultima avanguardia*, ed. by Lea Vergine, p. 74.
[314] See http://www.reprogrammed-art.cc/library/68/Strutturazione-cilindrica-virtuale [accessed 1 May 2021].
[315] *Davide Boriani: Arte cinetica, programmata, interattiva*, pp. 208.
[316] Gianni Colombo, 'Strutturazione acentrica', in *Nouvelle tendance: Propositions visuelles du mouvement international* (Paris: Mazarine, 1964), p. 14.

twenty different countries.[317] The 'Gestaltist research' – a term introduced by Argan – was the theme of the exhibition and Gruppo N – being most focused on a psychological approach to the work of art – won most of the prizes.[318] The presence of these two groups is explained in Argan's article 'Ricerca Gestaltica', published in the newspaper *Il Messaggero* on 24 August 1963. The article tries to define the groups' role in art history and their importance for a full understanding of the modern society of the 1960s. In Argan's opinion, their purpose was to define the function of visual experiences for the modern human being:

> Poiché nessuno schema lineare, volumetrico o coloristico è a priori previlegiato, il possesso e l'impiego di certi schemi a preferenza di altri riflette una condizione culturale, storica, cioè rivela la condizione di fatto dell'individuo e della società almeno in quella parte dell'esperienza che si compie con il mezzo visivo. […] In quanto si limita a riprodurre analiticamente e criticamente i processi di organizzazione formale, la corrente 'gestaltica' opera per verifica di ipotesi: la operazione, in questa fase iniziale, è ancora soltanto dimostrazione di operabilità.[319]

This article clarifies the strong relationship between programmed theories and scientific influences, such as cybernetics. Two sentences, in particular, recall Ceccato's studies on the functioning of human observation: 'La tendenza della mente a strutturare l'esperienza' and 'isolare certe entità unitarie nella congerie dei fenomeni'. Argan seems to provide an aesthetic solution to comprehend the social and cultural environment around him; this solution is represented by programmed creations that, thanks to the removal of non-perceptual factors, guarantee a functional artistic experience. The article thus expresses – in a synthetic and precise way – the role of programming in the creation of experiments for artistic consumption, namely through the design of kinetic sequences that guide the observer towards a rational and functional approach to the artistic object. Although Argan highlights the educational and formative aspect of Arte Programmata, he specifies that this approach is limited to demonstrating the functioning of a programming phase. Indeed, the artists' extreme emphasis on the programming aspect (which Argan calls the 'pre-oggetto' phase) of their works of art fatally diverts the attention from the ultimate goal of art: an experiment to analyse human cognitive functions

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[317] '"Oltre l'Informale" la IV Biennale d'arte di San Marino', *Domus*, 404 (1963), 37. The article contains the following statement: 'Non si tratta dunque di una manifestazione polemica contro "l'Informale", ma di una mostra informativa sulle tendenze che gli succedono'.

[318] Jerko Denegri, 'The conditions and circumstances that preceded the mounting of the first two New Tendencies Exhibitions in Zagreb 1961-1963', in *A little-know story about a movement, a magazine, and the computers arrival in art: new tendencies and bit international, 1961-1973*, ed. by Margit Rosen, pp. 19-26 (p. 23).

[319] Giulio Carlo Argan, 'La ricerca gestaltica', *Il Messaggero*, 24 August 1963, p. 3.

('post-oggetto' phase). The final objects, then, lose the possibility to offer observers an education in aesthetics. Argan describes this methodology as 'capace perfino di rinunciare al proprio fine per perfezionare i propri modi'.[320] With this statement, Argan underlines how the artists' attention to the design phase, the programming and the *mode* in which these experiments must interact with the observer relegates their reasoning to a hypothetical phase; in order to perfect their way of operating, they blindly refuse to consider the consequences and purpose of their research. One could therefore relate Argan's words to Calvesi's aforementioned comments in order to underline a certain lack of clarity in groups' vision, or the lack of a strong agenda for the future application of the rational approach they were applying in those years.

Although the groups' American touring exhibitions gained them an international reputation, at the same time they became alienated from the theories and the ideals proclaimed and discussed by critics and artists during the first and the second edition of the Zagreb New Tendencies (held in 1961 and 1963 respectively), attended by both groups T and N.[321] Croatian critics saw in Arte Programmata a parallel with their urgency to conceive a new notion of art, which should investigate visual perception and the relationship between pure shapes and knowledge. Ever since the first exhibition, it seemed clear that it was necessary to establish an international movement that could push the public to distance itself from canonical aesthetics and to become aware of the endless possible relations between the artwork and the human eye, as well as to establish a new link between art and society.[322] All these intentions, along with the idea of anonymity, the scientific approach and – especially for Gruppo N – socialist ideologies, were mentioned during the second edition of 1963 (organized by Mari), which gained a particularly strong international fame. The political orientation of the Arte Programmata groups emerges clearly from the effort to overcome individualism and to promote collective work. Artists considered the production of replicable objects and industrial development the right medium to make art accessible to everyone. Aesthetics, then, was meant to transmit a social value: the 'operatore estetico' with which Eco defined the artist in those years can be read, from a socialist point of view, as a person in charge of the collectivization of art. In this context, the socialist

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[320] Ibid. 'Non conduce al post-oggetto, ma neppure all'oggetto: conduce invece a una ipotesi di oggetto, a un pre-oggetto, alla descrizione di un comportamento produttivo. All'industria non si chiede ingenuamente conto della labilità dei suoi valori ma, criticamente, deel rigore dei suoi procedimenti: si chiede, in breve, se alla produzione degli oggetti preceda o no […] una fase pre-oggettuale, che configuri il futuro oggetto secondo le strutture storiche, attuali della mente umana. Mirando, infine, a inserirsi nel vivo delle metodologie produttive, la corrente "gestaltica" aspira a correggerne il brutale prammatismo quantitativo con l'esempio di una metodologia critica e sperimentale, capace perfino di rinunciare al proprio fine per perfezionare i proprii modi'.

[321] New Tendencies is the umbrella term for a series of five exhibitions and several meetings that brought together an international group of exhibitors, which were held in Zagreb on the following dates: 'nove tendencije', 1961; 'nove tendencije 2', 1963; 'nova tendencija 3', 1965; 'tendencije 4', 1968-9; and 'tendencije 5', 1973. Jerko Denegri, 'The conditions and circumstances that preceded the mounting of the first two New Tendencies Exhibitions in Zagreb 1961-1963', in *A little-know story about a movement, a magazine, and the computers arrival in art: new tendencies and bit international, 1961-1973*, ed. by Margit Rosen, pp. 19-26 (19).

[322] Ibid., p. 21.

idea of 'impegno' was merged with the concept of 'avanguardia' that includes a revolutionary intention. This link between social commitment and artistic avant-garde aimed to change people's interpretation of reality as well as to spread the social message extensively, thanks to the itinerant nature of the 'Arte Programmata' exhibition.[323]

This association with the political environment of the period reflects the Italian artists' relationship with Zagreb and its artists, but it is also exemplified by Mari's strong socialist ideology. Comparing the art market with capitalist society, Mari disapproved of any kind of economic exploitation of art, promoting a common and social use of design objects and artworks. In fact, in 1968 Mari refused to participate in any other collective exhibition in order to avoid any relationship with the art market, and he was extremely active – along with Boriani – in the political and social protests of the 1960s and the 1970s. More generally, the political debate was strongly present among the Arte Programmata's group members. However, given their participation in important and international exhibitions such as the Biennale of 1964, 'The Responsive Eye' and the American tour of 'Arte Programmata', the homologation to the art market appeared inevitable and ideologies seemed to collapse under the weight of commercial and promotional rules.[324]

The inner contradictions between a rejection and, at the same time, an acceptance of the economic rules of art was, in fact, one of the causes of Gruppo N's rapid decline: its members disbanded in 1964 after Chiggio, Costa and Landi made an anonymous dissolution proposal (their names would be revealed in 1967). The group's participation in the Venice Biennale intensified the disagreement because three serigraphs were sold to two foreign collectors, despite the group's convinced rejection of the art market.[325]

The last two Miriorama exhibitions – the thirteenth and fourteenth editions – took place at the Galleria del Naviglio in Milan in December 1963 and at Studio F in the city of Ulm (Germany) from 11 October to 4 November 1964, respectively.[326] 'Miorama 13' persisted in its analysis of the observer's involvement, with a focus on the ludic outcome of Gruppo T's research, as written in the brochure for the event:

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[323] Ibid.

[324] See 'Arte e libertà. Impegno ideologico nelle correnti artistiche contemporanee', *il Verri*, 12 (1963), 133-136, (pp. 134-5); *Arte Programmata e Cinetica in Italia 1958-1968*, pp. 44, 46, 50, 202, 207; Jerko Denegri, 'The conditions and circumstances that preceded the mounting of the first two New Tendencies Exhibitions in Zagreb 1961-1963', in *A little-know story about a movement, a magazine, and the computers arrival in art: new tendencies and bit international, 1961-1973*, ed. by Margit Rosen, pp. 19-26 (25-26); *Programmare l'arte: Olivetti e le neoavanguardie cinetiche*, ed. by Marco Meneguzzo, Enrico Morteo, Alberto Saibene, p. 37.

[325] Marta Previti, 'Il Gruppo N alla XXXII Biennale d'arte di Venezia', pp. 41-44 (p. 43).

[326] From 1962 to 1966, Anceschi attended the Hochschule fur Gestaltung in Ulm where, at the Department of Visual Communication, he had the opportunity to study with eminent scholars like Moles. See *Arte programmata e cinetica (1953-1963). L'ultima avanguardia*, ed. by Lea Vergine, p. 74.

Una rassegna di oggetti utili e inutili. Con accorgimenti ottici, magnetici, luminosi, usando materiali trasparenti, rifrangenti, riflettenti, con elementi componibili, sono stati costruiti oggetti di uso comune e altri oggetti che sono da guardare.[327]

Although the influence of the observer is direct and evident in the sentence 'oggetti di uso comune e altri oggetti che sono da guardare', doubts about the real identity of the artistic group once again arise.

In the second half of the 1960s, two or three members of Gruppo T frequently collaborated, especially for the creation of *environments*. One of the most renowned is *Ambiente per un test di estetica sperimentale*, created by Anceschi and Boriani in 1965 for 'nova tendencija 3'; the artists worked on the conception of a space where the time spent by the onlookers was measured and evaluated based on precise aesthetic stimuli and programmed visual sequences.[328] While Gruppo N officially dissolved in 1964, Gruppo T's members never officially separated. Nevertheless, any collaboration between members of Gruppo T terminated at the end of the decade.

Conclusion

In this chapter I have described the rapid rise and equally fast decline of the two main Arte Programmata groups in Italy. A lively artistic panorama has emerged, in which critics and artists struggled for a radical upturning of the canonical concept of the artwork, its function, and its social role. If, on the one hand, Gruppo T showed more boldness in proposing real kinetic artistic experiments, Gruppo N undoubtedly distinguished itself for its moral integrity and political ideals. The Milanese group, in particular, developed a strong theoretical reflection that supported the development of its artworks and that allowed, and guided, the birth and evolution of the concept of programming. This term is central to understanding the delicate relationship between Italian kinetic works and the observer. These works are conceived and designed with the awareness that the observer will often need 'to play' with them; the artist, then, prepares the basis for the subsequent involvement of the observer. With regard to the recipients of these experiments, it is worth mentioning an evolution in the works of the Milanese group, which were perhaps aimed more at investigating the observer's behaviour in relation to the variable programmed sequences. If, between 1959 and 1962, Gruppo T's production was characterized by modifiable and manipulable structures, in the second part of its short artistic experience we witness a technical and mechanical improvement, but also an impoverishment of multisensory interaction in favour of estrangement, optical illusion and retinal perceptual

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[327] 'Miriorama 13', from 19 December 1963 till 10 January 1964. See *Gruppo T: Miriorama, le opere, i documenti*, p. 50 for the picture of the invitation and the transcription of the text.
[328] *Gli ambienti del Gruppo T: Arte immersiva e interattiva*, p. 140.

stimulation. At the same time, the group started to focus on the idea of the artwork's space and time as closed entities, as separate realities where the observer lives in a constant flowing dimension. Programming is therefore the basis for an important educational project: to teach the artist about the cognitive and sensory functions of the observer and, at the same time, to educate the observer by entertaining them, teaching them about their cognitive abilities and their crucial role in the artistic design phase. In sum, what matters is not the object of art, now infinitely replicable, but the peculiarity of every lived artistic experience and how this experience is planned and offered to the public.

Chapter 3: The Origins and the Artistic Framework of the Arte Programmata Movement

The Italian Arte Programmata movement, from an art-historical viewpoint, can be seen as a significant moment in the aesthetic research on the effectiveness of artistic language, as already introduced with the figures of Moles and Bense. This art investigation has been conducted by Italian and international artists from Futurism and the Bauhaus school since the early decades of the twentieth century. By analysing the production of Gruppo T and Gruppo N, significant common features with previous or near-contemporary artistic movements can be easily identified. These similarities, that could be summarized in the artists' general scientific and pragmatic approach, can be highlighted both on a theoretical level (manifestos, innovative proposals, declarations of intent) and on a creative practice level (formal and stylistic similarities between the artworks as well as research on the observer's reaction). In general, a more accurate analysis of the works of art debated in this thesis can help to better contextualise this avant-garde movement by placing it with precision amongst the other innovative art expressions of the twentieth century.

Within the Italian and international artistic scene of the twentieth century, the movements and groups that offer the most interesting starting points to make a comparison with the experiences of Gruppo T and N are: M.A.C. (Movimento Arte Concreta), the Azimut Group, Futurism, and the constructivist tendencies within the Bauhaus. Moreover, worthy of a particular spotlight are the productions of some of the protagonists of the twentieth century such as Munari, Fontana, László Moholy-Nagy (1895–1946), Victor Vasarely (1906–1997), and Marcel Duchamp (1887–1968). This section aims to demonstrate how the focus on the formal rigour and on the use of geometric modules, as well as the tendency to a didactic kind of artistic experimentation aimed to enhance the perceptual relationship between the artwork and the observer can already be found in the Italian artistic research between the second half of the 1940s and the 1950s. Similarly, the Azimut group and the distinctive role of Manzoni had a strong influence in the subsequent elaboration amongst programmed artists of the ideational phase of a work of art, its temporal variables as well as the study of the meaning and use of the grid element made by some artists, especially Gruppo T. However, the roots and the origins of the study of kinetics and space as well as the relationship with the observer must be sought well before within the twentieth century. They can be found in the already mentioned, irreverent Futurist *Macchine Inutili* created by Munari, as well as in Duchamp's *Rotoreliefs*, but also in the research on space-time and light conducted by Moholy-Nagy. Thus, it will be possible to better define the Arte Programmata movement as the point of arrival of a diversified previous enquiry into the twentieth-

century artistic language. Thanks to the intuition of the Milanese and Paduan artists, a systemic and para-scientific attitude that reflects the peculiar cultural environment of this period is added to these previous studies.[329] The aim of this chapter is then to reframe the study of the Arte programmata movement taking into consideration both the national and international avant-garde context.

3.1 Arte Programmata and M.A.C. – Movimento Arte Concreta: Geometric Lines and Structural Rigour

The first element that must be taken into consideration in the stylistic analysis of Arte Programmata is its clear connection with the Italian Movimento Arte Concreta (M.A.C.), whose exhibition history takes place between 1948 and 1958.[330] Amongst the founders and major exponents of the movement is Munari, a key figure and a link between the major artistic trends of the entire twentieth century. The term 'concreta', as Dorfles explained in a 1949 text, is synonymous with an art that does not abstract itself from real and physical models, but that is the tangible expression, in form and colour, of the artist's intuition.[331] What most characterizes it is the use of simple geometric figures and, above all, of a form or graphic model that is repeated on the surface of the canvas to give life to a complex geometric structure.[332] The M.A.C. works of art are therefore characterized by a formal and stylistic rigour: as expressed by Dorfles, the geometric reference model chosen by the artist is repeated on the surface of the painting following a pre-established formal scheme: this process determines the compositional rhythm of the work (fig. 40 and 41). As specified by Dorfles in the catalogue for the M.A.C. exhibition at the Milanese Galleria Bompiani in 1951, the chosen graphic module can span

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[329] For the use of the words 'systemic and para-scientific' to define the visual research of programmed artists: Francesca Pola, 'La costellazione della nuova "concezione artistica". Azimut/h epicentro della neoavanguardia europea', in *Azimut/h continuità e nuovo*, ed. by Luca Massimo Barbero, pp. 123-143 (p. 137).

[330] The M.A.C. group was formed in December 1948 by Atanasio Soldati (1896–1953), Munari, Dorfles, and Gianni Monnet (1912–1958) and it intertwined over the years with the artistic research conducted by Ettore Sottsass (1917–2007), Fontana, and Piero Dorazio (1927–2005). The evolution of the artistic movement can be divided into two phases: the first, between 1948 and 1953, focused purely on painting, while the second, between 1953 and 1958, focused more on an idea of a total kind of art and a synthesis between the plastic arts and architecture. Through M.A.C. production we witness the recovery and the critical relaunch of other movements of the past such as Futurism and the European abstract and concrete movements of the Thirties. The Concrete Art movement was born officially in 1930 and was theorized in the *Art Concret* manifesto, written by the artist Theo Van Doesburg in Paris. In the manifesto it is clarified how the concrete art is nothing but the plastic and exact union of shapes and colors, where the latter have no other meaning than themselves, without any reference to the abstraction of the figurative element. See *Movimento Arte Concreta 1948-1958*, ed. by Luciano Caramel (Modena: Galleria Fonte D'Abisso Edizioni, 1987), pp. 13-15 and Gillo Dorfles, *Ultime tendenze nell'arte d'oggi: Dall'Informale al Neo-oggettuale*, pp. 81-82.

[331] The Dorfles's text was written for the artist Galliano Mazzon's exhibition at the Salto Bookshop in Milan. See *Movimento Arte Concreta 1948-1958*, ed. by Luciano Caramel, p. 17.

[332] Dorfles expressed this concept in 1951 during a M.A.C. exhibition at the Galleria Bompiani in Milan. He identifies in the 'modulo grafico' the essence of these artists pictorial creation. Ibid., p. 19.

between different types, from scroll-like simple lines to cell-like amoeboid shapes. The preferred modules, however, are those of geometric inspiration, such as lozenges or squares. The peculiarity of these shapes on the canvas is that they never have an ornamental feature but constitute, instead, the formative centre of the entire work.[333]

The formal and modular rigour of the artistic creation proposed by the M.A.C. group can be related to the concept of 'module' or 'structure' that characterizes – in the inventive and creative phase as well as during the activation phase and the relationship with the public – the essence of programming in programmed artworks. The structure or model of a programmed work can be defined as the conception and programming of different aesthetic situations that are designed to be activated and lived by the observer during the artistic experience. M.A.C. structural rigidity, then, has its roots in a different type of rigour (formal and geometric), but the rational and methodological approach to the artistic language remains the same.[334] While M.A.C. is characterized by a balanced alternation between constructivist research and the freedom offered by the canvas, programmed artworks present the interchange between structural rigidity and the observer's freedom with the final purpose to explore the perceptual link existing between artwork and viewer. This rational approach fully justifies the words expressed by the critic Argan who, in 1949, described the M.A.C. artworks as 'sperimentazioni formali', choosing a term that is extremely significant for programmed artists to define their production. Argan's text – written for the exhibition of 24 original lithographs by M.A.C. artists – continues with some references closely related to the agenda of Gruppo T and Gruppo N, namely the didactic function of Concrete Art and the attention to an accurate perception of reality:

Cessando di valere l'antico rapporto del dare e del ricevere, l'atto creativo coincide col percettivo: da potersi dire che quest'arte, generalmente considerata prodotto di freddo computo intellettualistico, è invece l'arte della pura percezione. […] Il suo obiettivo non è un formalismo raffinato, di quintessenza, ma la determinazione di una condizione fondamentale per l'esperienza piena ed immediata del reale. Questa posizione immanentistica spiega l'intento didattico, nel senso di un'educazione diretta della

[333] Gillo Dorfles, presentation for the catalogue of the exhibition 'Gli artisti del M.A.C.' at the Galleria Bompiani in Milan from the 7th to the 16th of April 1951 repr. in Ibid., p. 34.

[334] Dorfles underscores the similarities between the concretist research and the development of Gruppo T and Gruppo N theories focusing on the importance of a structural model approach: 'La rigidità compositiva, la ricerca di colori esclusivamente timbrici, hanno lasciato il posto a quelle che potremmo chiamare ricerche di "gradienti strutturali" […], ossia il tentativo – approssimativo ma evidentemente legato a più esatte e rigorose ricerche percettive – di riuscire ad ottenere, attraverso trame strutturali diverse, degli effetti che sono di carattere piuttosto psicologico che estetico'. Dorfles, *Ultime tendenze nell'arte d'oggi: Dall'Informale al Neo-oggettuale*, p. 84.

percettività, delle correnti concretiste; la loro ricerca di una utilizzazione immediata e totale del dato formale […].[335]

As previously underlined by Dorfles, the new concrete tendency developed 'in una società nuova' as for programmed artists at the peak of the Boom Era:[336] it is a kind of art where, both from a plastic and a pictorial point of view, we witness the development and use of 'unità-base'[337] which possess value in themselves and which recall the basic modular structures at the foundation of Boriani's research (see Chapter 2, section 2.2.1). Furthermore, Argan defines the constituent elements of a concrete work – such as line, volume, colour – as 'possibilità di una definizione formale di una realtà "in fieri"',[338] admitting an ever-changing surrounding environment. Argan adds that: 'questa condizione immanentistica spiega l'intento didattico, nel senso di un'educazione diretta della percettività'[339] justifying in this way the importance and the necessity of the perceptual approach as well as the importance of a clear and precise structure of the work of art to speculate on the observer's perceptual consumption. We can recognize in Argan's words – ten years earlier than Gruppo T's first programmatic text – the themes of the Italian Arte Programmata movement, whose research started precisely from the observation that art must be shaped on a new and modern reality. Furthermore, one of the most important outputs for programmed 'operators' emerges from the words of the critic well ahead of their time: the perceptual education of the observer, that is essential for the awareness of the emergence of a new aesthetic theory.

It is impossible not to consider the idea and the role of perception without including, as previously noted, the importance that dynamism and the role of the machine have in this analysis. In the statement for the '2ª mostra di esperienze di sintesi tra le arti. Studi per forme concrete nell'industria motociclistica', organized in Milan in 1952, it is underlined that the artist can be compared to an engineer who invents a machine.[340] Within the same year, the published declaration for the exhibition 'Arte Organica, Disintegrismo, Macchinismo, Arte Totale e "Danger Public"' presents many common elements with groups T's and N's research purposes, and, above all, with the programmatic text written ten years later in 1962 by Eco for the first collective exhibition at the Olivetti store in Milan. The text, in fact, offers a clear analysis of the environment that surrounds the modern observer and how it has become necessary for art to adapt itself to it:

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[335] *Movimento Arte Concreta 1948-1958*, ed. by Luciano Caramel, p. 31.
[336] Ibid.
[337] Ibid.
[338] Ibid.
[339] Ibid.
[340] ' […] l'artista di oggi inventa forme e accordi come un ingegnere inventa una macchina nuova', from the text written for the exhibition '2ª mostra di esperienze di sintesi tra le arti. Studi per forme concrete nell'industria motociclistica'. The text is signed 'G.S.'. Repr. in Ibid., p. 40.

Come pretendere infatti che oggi il pubblico si interessi ancora di problemi pittorici o plastici quando è abituato a vedere tutto già concretamente risolto nel cinema, nella pubblicità luminosa, nei grandi plastici reclamistici delle Fiere Internazionali dove ogni mezzo, il più moderno, il più nuovo possibile, è usato per attrarlo e per comunicargli le ultime invenzioni del progresso? L'arte è dunque morta o ha soltanto cambiato aspetto, senza che molti se ne accorgessero? […] L'arte non è morta, ha soltanto cambiato indirizzo […].[341]

These few paragraphs present a clear reference to a progress that keeps going forward, but also a precise description of an urban and modern environment where people live, characterized by new and dominant sensory stimuli that focus the attention of modern people.[342] This idea is also highlighted in the presentation for the aforementioned M.A.C. exhibition '2ª mostra di esperienze di sintesi tra le arti. Studi per forme concrete nell'industria motociclistica', where the artists' urgency to deal with aesthetic problems that may relate to the taste of modern masses is very well emphasized. The attention to mass production and the related industrial materials involved in the process were fundamental for the young artists belonging to Gruppo T and N, whose works are characterized by materials such as PVC, glass, metal, neon lamps, plexiglass, and aluminium. The aim was to make their works endlessly replicable since their functioning and their programming – and not their material component – is the focus of their research. However, the investigation on this type of materials is already present in Munari's and M.A.C.'s research: in January 1952 the group – guided by an interdisciplinary drive for the creation of a new type of art that encompasses every field of research – organized the exhibition 'Materie plastiche in forme concrete' which collected objects created in Rhodoid (an incombustible thermoplastic derived from cellulose acetate), Sicofoil (a kind of semi-rigid plastic material), celluloid, plexiglass, Perspex (a solid transparent plastic made of polymethyl methacrylate) and plastic laminates.[343] These provocations are paramount because they occurred simultaneously with the disruptive development of the Italian design which will later experience its golden decade between 1958 and 1968. Design shared with Arte Programmata the goal of changing the relationship between humankind and the world around it, seeking a reconciliation between science and art. Design, like Gruppo T's and N's experiments, made the planning and programming phases

[341] From the text written for the exhibition 'Arte Organica, Disintegrismo, Macchinismo, Arte Totale e "Danger Public"'Ibid., pp. 46-47.
[342] 'Questi disegni esposti sono infatti dei commenti di carattere estetico, sono una ricerca di nuove linee armoniche possibili, sono una dimostrazione che un artista d'oggi […] può e deve interessarsi dei problemi estetici che, in definitiva lo riguardano e riguardano con la produzione, il gusto della massa'. See Ibid., p. 40.
[343] Luciano Caramel, 'Le alternative astrattiste', in *Arte in Italia*, pp. 43-95 (pp. 78-79).

its essence.[344] These new materials were used by the artists of the M.A.C. especially for plastic and sculpted works where artists perceived the need for a dynamic contamination of the surrounding space: this concept had deep roots in the Futurism season (fig. 42).

The research on the activation of the environmental space and the perceptual dynamism of the observer was meticulously pursued by Munari in the years of his participation to the M.A.C. activities, revealing his interest for the movement and his avant-garde overcoming of the canonical concept of art making.[345] In particular, there are three different types of work created by the Milanese artist that have important connection points with Arte Programmata projects. The first – following a chronological order – is the already mentioned production of *Macchine Inutili* where the attention for the concrete and neo-plastic geometric module is combined with the research on random movement (fig. 43).[346] It is a type of work that undergoes an uncontrolled evolution in space, a space in which the observers themselves act by 'triggering' and giving importance to the physical area around them. Viewers could circle around the machines to better understand its evolution and its chromatic and formal changes: in this way Munari could investigate the perceptual instability that develops in people's eyes in the relationship between the background and the figure.[347] A recurrent theme for this artist is the perceptual stimulation given by the optical intermittence and the instability in the identification of the background and the foreground figure in the artistic experience offered to the observer. During his collaboration with the M.A.C. group, he developed a cycle of works called *Negativi-Positivi* where, again, the interest in pure geometric shapes is combined with perceptual ambiguity. A *Negativo-Positivo* could be defined as a *Macchina inutile* on canvas where the steadiness given by the two-dimensionality does not alter its engaging value (fig. 44). The observer's effort lies in the identification of the work as a set of planes and parts that fit together where there is no actual background, but a fusion of different, concrete, and real autonomous forms. The viewer is free to decide the order and the evolution of the planes that the artist proposes on the canvas for himself.

Developed in 1946, the other fundamental creation by Munari that ratifies his need to transform art into a spatial and *programmed* concept is undoubtedly *Concavo-convesso*. This piece

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[344] Anty Pansera, 'Canto & controcanto. Arte Programmata e disegno industriale dall'opera all'oggetto d'uso. Dal multiplo alla serie', *Arte Programmata e Cinetica in Italia 1958-1968*, ed. by Marco Meneguzzo, p. 56.

[345] '[…] Munari che nei *Negativi-Positivi*, nelle rinnovate *Macchine inutili*, nei *Concavo-convessi*, nelle *Proiezioni a luce polarizzata* elabora forme in una costitutiva dinamica percettiva tra figura e sfondo e nella ricerca di un'attivazione dello spazio reale e dell'ambiente […]'. Luciano Caramel, 'Le alternative astrattiste', in *Arte in Italia*, pp. 43-95 (p. 76).

[346] 'Già le "macchine inutili" erano "costruite secondo precisi rapporti armonici e matematici: elementi in progressione geometrica, oppure un rettangolo armonico tagliato in parti equilibrate e ricomposto unendo i pezzi con fili secondo le leggi dell'equilibrio"'. Carlo L. Ragghianti, *Ricerche visive, strutture, design di Bruno Munari* (Milan: La Cromotipo, 1962), catalogue of the exhibition.

[347] This distinctive play of planes that characterizes these works is well expressed in 'I Negativi positivi di Munari', *Domus*, 273 (1952), 45-68 (p. 68), and in Jeffrey Schnapp, 'The Little Theatre of the Page', in *Bruno Munari: The lightness of Art*, pp. 115-131 (pp. 126-131).

can be described as a simple square wire mesh that is folded in various ways to create a sinuous work that is then hung from the ceiling to evoke the idea of motion with its own formal characteristics (fig. 45, 46, and 47).[348] It combines the typical features of the *Macchine inutili* (the use of geometric shapes, the random movement, and the perceptual stimulation offered by the different planes of space involved) with a greater viewers' interaction. The viewer, in fact, interacts with the surrounding space, with the work of art itself, and with the lights that are arranged in the area by the artist to complete and enhance the experience. One of the inspirations for the idealization of the *Concavo-convesso* work is the series *Ribbon without End* created by the Swiss concrete artist Max Bill (1908–1994)[349] between 1935 and 1936 and published in issue 210 of *Domus* magazine in 1946.[350] Bill's use of the Möbius strip is the inspiration for the study on the evolution and dynamism of a shape in the space by Munari. Whilst Bill's series has a greater architectural characterization in its dialogue with the space that surrounds it and a marked structural fixity due to the use of metal or stone materials, Munari's work is more complex and interacts actively with the environment that surrounds it, thanks to the use of lightweight materials such as wire mesh (fig. 48). *Concavo-convesso* can be defined as one of Munari's works that most closely resembles Arte Programmata research because, even without an electric motor, it presents the distinctive alternation of programming and chance. The planned aspect can be found in the conception and creation of a work of art that from a material (the fact of being drilled) and formal viewpoint engages in a dialogue with the space that hosts it. Furthermore, the plastic figure obtained by curving the square of wire mesh is folded by the artist in pre-established points based on an initial project. In fact, the fixing points, as specified by Munari himself, are established on the surface of the square with harmonic proportions.[351] On one hand, the use and planning of well-placed light sources amplify its structural qualities creating shadows that emphasize the immersive experience offered to the observer. On the other hand, the random aspect is given by the impossibility to determine its precise motion as well as the movements of the people around it.[352] However, what needs to be highlighted about this work is the possibility offered to the

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[348] Bruno Munari, *La scoperta del quadrato* (Rome, Centro P. R. della Mobili Mim, 1962).

[349] Max Bill, artist and theoretician, owes his interest in the study of movement and space to his training at the Dessau headquarters of the Bauhaus school. His work from the beginning focuses on the active dialogue between the plasticity of the work of art and space through the lens of concrete theory. This implies in his works the use of simple geometric shapes and the use of mathematical formulas as a solid basis for his research on movement. The greatest difficulty – evident from his production over the years – lies in the possibility of combining the idea of movement and artistic space with the use of materials such as bronze, marble, brass or copper. See Popper, *Origins and development of Kinetic Art*, pp. 85-86. For an in-depth look at the figure of Bill, his works and architectures, and, in particular, his experience in post-war Italy, see Roberto Fabbri, *Max Bill in Italia* (Milan: Mondadori, 2011).

[350] Max Bill, 'La costruzione concreta e il dominio dello spazio', *Domus*, 210 (1946), 18-21. See also Anthony White, 'Bruno Munari and Lucio Fontana: Parallel Lives', in *Bruno Munari: The lightness of Art*, pp. 65-87 (p. 74).

[351] Munari, *La scoperta del quadrato*.

[352] In the record for the book *Su Munari: 104 testimonianze più 152 inediti di Bruno Munari*, edited by Beppe Finessi in 1999, the artist Alviani wrote about his experience with *Concavo-convesso*. He described it as a work that tickles the brain, programmed but also unpredictable: 'Un'opera semplicissima ma dall'apparenza complessa, senza inizio né fine;

viewer to touch the structure. The observer then becomes the cause of the subsequent random movements of the work.[353] The artwork is therefore programmed in the artist's studio to be interactive during its functioning. Like any Gruppo T's or Gruppo N's artwork, the programming activity leads to certain random consequences not foreseeable by the artist, but that actively set in motion the role of the observer (see Chapter 4). Furthermore, *Concavo-convesso* has been conceived to be serially produced adopting the techniques of industrial production that put it in close relation with the programmed production.

A direct formal and stylistic connection between Munari's *Macchine inutili* and *Concavi-convessi* production and Gruppo T's works lies for example in one of Devecchi's creations of 1964 called *Deformazione assonometrica* (fig. 49). The moving shadows of a real wire dihedral are reflected on a rotating white disk, suggesting a cubic volume that is constantly changing due to the disk's movement.[354] The shadows of the real object offer ample perceptual possibilities to the observer: the object, integrated with its virtual double, creates a metamorphic set in relation to the angles that the rotation determines and to the light sources around it (fig. 50).[355] What is striking in this work is the use of movement, lights and, consecutively, shadows to create a work in continuous mutation where the viewers contribute to its final meaning by moving around it. We see in this work an attention for the perceptual stimulation offered by the overlap of two planes, one real and one illusory, a kind of interest that, as we have seen, can be found in Munari's research since the 1940s.

Another clear testimony of how *Concavo-convesso* could have influenced Arte Programmata production is the creation by Varisco of a particular type of magnetic table amongst the many created by the Milanese artist (see also Chapter 4, section 4.2.2). In addition to the tactile stimulation offered to the observer – who is able in this way to act directly on the surface of the artwork by generating always different combinations of shapes and randomly influencing the evolution of the work – an

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che, se appesa in uno spazio con un invisibile filo, si muoveva su se stessa e formava immagini, come la sua ombra, sempre diverse, sorprendenti, di grande spettacolarità. L'ho avuta sempre presente nella mia memoria quest'opera, per le tante componenti che sollecitavano il cervello: la forma, la luce, il movimento, la leggerezza, la tecnologia, il fare umano, la programmazione, l'imprevedibilità, pur essendo così elementare. Source: http://www.munart.org/index.php?p=13 [accessed 29 October 2019].

[353] Anthony White, 'Bruno Munari and Lucio Fontana: Parallel Lives', in *Bruno Munari: The lightness of Art*, pp. 65-87 (p. 80). The *Concavi e convessi* series represent a valid example of artworks that are useful to reflect upon the role of the observer, upon the sensory stimulation of the artistic experience, and upon the importance of its programming. However, they also force the observer to think more generally about the concept of art, be it the object per se or the research behind its conception. Indeed, Concavi e convessi are highly reproducible and marketable objects but, as specified by Munari in *Arte come mestiere* in 1966, they are also extremely fragile, short-lasting, and not at all adaptable to a museum environment. *Arte come mestiere* contains a thorough analysis of works and themes done with drawing and images where Munari provides an exhaustive and compelling presentation of design and its diverse specializations. See Bruno Munari, *Arte come mestiere* (Bari: Edizioni Laterza, 1966), pp. 183-185.

[354] Dihedral angle: each of the two parts in which the space is divided by two half-planes having a straight line in common. The artist himself used this term to define the object. See http://www.gabrieledevecchi.it/opera.php?idO=12 [accessed 29 October 2019].

[355] Ibid.

important role is played by the wire mesh. The mobile elements superimposed on the mesh, generate a series of shadows that stimulate the observer and amplify the possible reading planes of the work (fig. 51).

The third of Munari's works that have noteworthy points of similarity with Arte Programmata production is the series called *Macchina Aritmica* created from 1951. The peculiar features of these items are the programming of the observer's physical interaction, the unstable and random movement, the use of mechanical elements suitable for dynamism like springs or clockworks, the extreme playful characterization, and the temporal variability (fig. 52). These works display once again the union of programming and randomness, where the former is identifiable in the creation of machines designed to produce multisensory stimuli, while the latter is given by the impossibility to predict the rhythm and intensity of the movement generated from the object.[356] It should also be added that these devices, assembled with reused pieces, were created to be activated by the observer who gave life to the dynamism of the work through the loading of a spring mechanism. The sounds produced by its functioning, the presence of elements unrelated to the context of a mechanical device, such as for example feathers, and the erratic movements make the machine highly playful. The spring activates the machine with a 'wriggling dance' that glorifies 'not heroically but poetically' the idea of motor.[357]

In this sense the alternation of reason and chance, rationality and play, autonomy of the device and human interaction in these works needs to be clearly underscored. This concept makes these machines appear in a new light, one where they do not glorify themselves, but celebrate their poetic imperfections. Through his creations Munari manages to elevate Concrete Art offering it the possibility of becoming a real expression of modern times. *Concavo-convesso* and *Macchine aritmiche,* produced contextually to his collaboration with the M.A.C. group, represent a link between the neo-concrete research of the 1950s and the Arte Programmata one of the 1960s, where the idea of the work of art has evolved into a rational structure of regular aesthetic situations.

The proximity of Italian kinetic artists to programmatic writings such as the *Manifesto tecnico dello Spazialismo* (1951) and the *Manifesto del Macchinismo* (1938 and republished in 1952) has already been discussed in the previous chapter. Published in the same period, they both contain an earnest declaration of how art should conform itself to the prevailing domain of technical and mechanical materialism. The movement and the instability that dominates the modern world must be

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[356] Giovanni Rubino 'Bruno Munari versus Programmed Art: A Contradictory Situation, 1961-1967', in *Bruno Munari: The lightness of Art*, pp. 89-111 (pp. 91-92).
[357] *The machine, as seen at the end of the mechanical age*, ed. by K.G. Pontus Hultén (New York: The Museum of Modern Art, 1968), p. 164.

expressed with the creation of works of art where we witness the combination of space and time.[358] In 1952, in the December issue of the monthly bulletin *Arte Concreta*, along with the *Manifesto del Macchinismo,* Munari published three other programmatic texts: *Disintegrismo*, *Arte Organica*, and *Arte Totale*.[359] What is important to emphasize in the first one is the reference to the work of art as a set of basic elements or modules that together constitute the harmonic structure of the artwork. It is introduced here a pivotal topic for the definition and the total understanding of Arte Programmata, that is to say the idea of the artwork as a structure of signs or aesthetic situations that, thanks to programming, are planned by the artist to be subsequently activated in a precise order during the functioning of the artwork itself (see Chapter 4).[360] The same can be said for the *Arte Organica* manifesto where Munari, emphasizing the importance of correlating art with the mutability of nature, seems to anticipate the comparison proposed by Arte Programmata members between the alternation of programming and randomness, typical of their works, and the presence of order and entropy that instead characterizes the laws of nature (see Chapter 4).[361]

The reference to concepts such as structure and aesthetic sign leads to the development of another important correlation between Arte Programmata and the neo-concrete tendencies that were active in Italy and in Europe in that period. In this regard it is necessary to broaden the scope of this analysis to include the already mentioned figure of the Swiss artist Bill. Following the enthusiasm caused by the constitutions of neo-concrete groups around Europe between 1958-60, Bill organized a major exhibition in Zurich with the aim of revamping and restoring the value of the movement.[362] What is important to underline here is Bense's presence in this event in the role of theoretical consultant. Bill is cited in different occasions in Bense's work *Aesthetica* for a practical explanation of his 'correality' theory: Concrete Art – whose essence lies in the use of simple and pure geometric shapes – is defined as the real concretization of the aesthetic signs that carry information in painting

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[358] 'Colore, l'elemento dello spazio, suono, l'elemento del tempo ed il movimento che si sviluppa nel tempo e nello spazio. Sono le forme fondamentali dell'arte nuova che contiene le quattro dimensioni dell'esistenza'. See *Manifesto tecnico dello Spazialismo*, repr. in Cecilia De Carli 'Lo Spazialismo, in *Arte in Italia*, pp. 99-110 (p. 109).

[359] Giorgio Maffei, *M.A.C. Movimento Arte Concreta, Opera editoriale*, p. 156.

[360] Ibid. 'Gli elementi dell'opera disintegrata saranno disposti secondo un modulo, una misura armonica e le loro forme saranno riconoscibili per affinità artistica. […] Purché tutti assieme si riconoscano di un'unica famiglia come le varie parti che compongono un albero o un animale, pur diversissime di materia, forma, colore, sono legate assieme'.

[361] Ibid. 'In natura tutte le cose mutano […] Questa è la realtà. È quindi vano che gli artisti tentino di fare opere d'arte 'eterne'. L'opera d'arte deve rinnovarsi continuamente'.

[362] See Gillo Dorfles, *Ultime tendenze nell'arte d'oggi: Dall'Informale al Neo-oggettuale*, p. 81-2. And Enrico Crispolti, 'Neoconcretismo, arta programmata, lavoro di gruppo', 20-67, (p. 24). The exhibition is called *Konkrete Kunst. 50 Jahre Entwicklung* and it took place in Zurich at the Helmhaus between June and August 1960. The exhibition, which was also born as a response to the predominant Informale current of the period, aims to relaunch the historical movement of Concretism and to promote the new neo-concrete trends. Amongst the historical artists that have been included under the label of 'concrete' for this exhibition it is possible to cite Vasili Kandinsky, Piet Mondriam, Jean Arp, Robert Delaunay, Giacomo Balla, Moholy-Nagy.

or sculpture.[363] Features such as colours, the arrangement of shapes on the surface, proportions, topological relationships, and perception create through their relationship – that is to say through the

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[363] By around 1910, Wassily Kandinsky, Frantisele Kupka, and other painters had created the first non-descriptive paintings that had spread under the name 'Abstract Art', considering the new form of painting as the result of a reductive process of abstraction or extraction of rhythmic or structural elements from perceptual reality. Twenty years later, the Dutch painter and theorist Theo van Doesburg – unanimously considered the founder of Concrete Art – called a particularly radical branch of abstract art 'concrete'. Albeit this definition provoked a sense of rejection among artists and the public, his move had the merit of reigniting the debate on the foundations of art making. The programmatic manifesto of a new, radically non-figurative art, published in Paris in the spring of 1930 under the title of *Art Concret*, represented at that time the most advanced stage of an evolutionary process that had begun in the second half of the Nineteenth century within the non-figurative art currents. Unlike the movements active at the beginning of the Twentieth century, represented mainly by Piet Mondrian's Neo-Plasticism, Kazimir Maljevich's Suprematism, and Wassily Kandinsky's abstractionism, Concrete Art was distinguished by its accentuation of rational aspects and a certain visual logic. The idea of composition was replaced by that of construction, the cult of intuition had to give way to calculation, the subjective and individual components of the previous movements were countered by objective and universal motivations. Taken together, these aims led to a progressive conceptualisation of artistic work. Indeed, one of the main claims in van Doesburg's 1930 manifesto is that the work of art must be entirely planned and formed in the mind before it is materially executed. The signatories of the manifesto postulated the use of mathematics as a guarantee for objectivity in their pictorial and formal decisions. The innovative position of the Art Concret group of 1930 can be summarised by highlighting five main points: the predominance of conceptual clarity; the essential use of line, plane and colour; visual logic; the technical exactitude and precision; objectivity. In this new art form, the intentionality of the entire aesthetic process shifts from meaning to signifier, from sense to sign, and from the content to the structure of the work of art. The first and last issue of the magazine *Art Concret* was printed in early April 1930: among the artists who were active in the group we can remember Jean Hélion, Otto Gustav Carlsund, Léon Tutundjian, and Marcel Wantz. A few months later there was a recruiting of new members on a large scale to establish the Abstraction-Création association (which published five yearbooks from 1932 to 1936). Towards the end of 1930, the idea of creating the Abstraction-Création association took on more precise contours, as more and more artists declared themselves willing to participate: Sophie Taeuber, Jean Arp, Jean Gorin, and others. As for the now dispersed Art Concret group, Hélion and Tutundjian were among the first to join and were elected to the board of the new association. Switzerland constituted the largest foreign delegation of Abstraction-Création: this movement, although still a minority, was slowly gaining influence and in 1935 a young Abstraction-Création adherent, Hans Emi, was commissioned to organise the exhibition 'These, Antithese, Synthese' in the Lucerne Art Museum. The display had a wide resonance and saw the participation of already well-known artists such as Kandinsky, Léger, and Picasso, as well as fellow Abstraction-Création members such as Sophie Taeuber, Jean Arp, and Mondrian. In Italy, the gallery Il Milione in Milan was an international point of reference for the non-figurative avant-garde art in the 1930s. Solo exhibitions were organised by Kandinsky and Moholy-Nagy among others. Moreover, the gallery gave artists such as Osvaldo Licini, Mauro Reggiani and Luigi Veronesi an opportunity to show their works. Some of these young people joined Abstraction-Création: Luigi Veronesi went to Paris several times and received important stimuli. The exhibition 'Abstract and Concrete' at the Reid & Lefevre Gallery in London on 15 February 1936 raised the question of what meaning was then attached to the word 'concrete', as well as to what extent the programmatic rigour of the 1930 *Art Concret* manifesto was still perceived, and which works were considered representative of Concrete Art. In fact, works by Alexander Calder, Barbara Hepworth, Mondrian, Ben Nicholson, and others were exhibited, testifying to the fact that concrete art had undergone a change, moving towards a desire for synthesis with other ideas and movements while remaining rational. As a clear example of this, it is necessary to introduce the figure of Max Bill. He published an interesting text in the catalogue of the exhibition 'Zeitprobleme der Scbweizer Malerei und Plastik' ('Current Problems of Swiss Painting and Sculpture'), organised in the summer of 1936 in Zurich. This text is the first version of a statement of definitions that Bill also rewrote later. In the text he takes up the abstract-concrete dichotomy without speaking of Concrete Art, but instead of 'gestaltung', saying that this activity is based on form, colour, light, and movement. Bill then writes that 'konkrete gestaltung' arises through its own means and laws. However, in his text, unlike van Doesburg, there are no technical or operational indications: there is no trace of discourse on mathematics, geometry, universal language, or the relationship to the sciences. About half of the 1936 text lingers on a didactic comparison between music and 'optical-concrete gestaltung'. Bill draws the conclusion that this kind of 'gestaltung', like music, communicates optical pleasure through the purity and clarity of forms and colours. Konkrete gestaltung still remains a milestone in the history of concrete art influencing its subsequent course. The year 1936 also marked the end of the Abstraction-Création association. In Italy, however, there were still active nuclei in Como and Milan, while Switzerland slowly became a stronghold of concretism and found an organisational platform in the Allianz association. In 1938 the first issue of the journal *XXe Siècle* was published in Paris where Kandinsky published the article *Concrete Art*, in which he explained why he would henceforth call his painting 'concrete' and no longer 'abstract'. The decision by one of the founders of abstract painting caused a stir in the circle of constructivist artists; thus, discussions around concepts and terms were rekindled. In the decades after the Second World War, this statement by Kandinsky contributed in no small measure to

dialogue amongst these different signs – the aesthetic reality that Bense defines as 'correality'.[364] The concept is explained in a simpler way by Bill himself who defines concrete painting as 'una rappresentazione nella realtà di pensieri astratti invisibili'.[365] Although a more in-depth discussion of the role of Bense and the innovation brought on by the use of a modal approach to investigate the role of the work of art will be presented in the next chapter, it is important to note here that both the neo-concrete and programmed trends of the period are useful for a rational but, at the same time, interdisciplinary aesthetic analysis of the artistic production. This concept is underlined by Bill who writes that:

L'artista moderno riunisce nella pittura concreta la conoscenza della psicologia, della geometria e della matematica con la scienza dell'azione fisiologica dei colori. E tutto

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strengthening the prestige of Concrete Art. As Hans Jörg Glattfelder points out 'Alla fine del suo primo decennio di vita l'arte concreta si trovò dunque in una crisi d'identità che con l'adesione di Jean Arp nel 1944 aumenterà ulteriormente. In quel decennio, se da una parte la discussione teorica e l'elaborazione di strategie non erano molto progredite dopo l'inizio promettente del manifesto di van Doesburg, dall'altra parte il lavoro individuale di singole personalità come Sophie Taeuber, Frantisele Kupka e Georges Vantongerloo aveva creato un campionario ricco di opere innovative. Furono questi esempi a stimolare nella seconda metà del Novecento una generazione nuova e pronta a continuare il cammino intrapreso'. In 1944 several works by artists devoted to non-figurative depiction were shown in Switzerland under the heading 'Concrete Art'. This was the first official appearance of the term 'concrete' in an exhibition title. The participating artists belonged to the so-called first generation of abstraction and the Bauhaus, the Dutch De Stijl movement, and the Parisian circle of the group Abstraction-Création. The exhibition documented a range of new depictive styles, already capable of retracing the development of concrete art with the aid of the works by Kandinsky, Klee, and Mondrian, while also functioning as a legitimization of the non-figurative concepts that were been practiced at the time. Another milestone in the history of Concrete Art in the late 1940s is represented by Bill, who published his text titled 'Die mathematische Denkweise in der Kunst unserer Zeit' [Mathematical thought in art] in 1949, emphasizing Concrete Art's proximity to science as an adequate expression of the technical age. In Bill's opinion, invisible aspects become imaginable and perceivable in Concrete Art: he saw the relationship between the natural sciences and art. In the same years galleries made a vital contribution to the rise of geometric art. Foremost among them was the one founded by Denise René in 1944, which quickly specialised in this form of expression: it exhibited among many Vasarely, Harp, and Mondrian. Other galleries worthy of mention are those of René Drouin, who organized an 'Art Concrete' exhibition in 1945. Moreover, the Galerie Maeght organized the exhibition 'Les Premieres Maitrês de l'Art Abstrait' in 1949. In the same years Bill advocated the propagation of Concrete Art beyond the borders of Switzerland by establishing contact with artists in South America. After 1945, a lively succession of displays got underway not only in France, but also in other countries in Europe and beyond. In 1947 Bill acted as co-organiser of a comprehensive exhibition of Concrete Art in the Palazzo Reale in Milan called 'Arte Concreta'. This was one of the factors leading to the founding of the M.A.C. (Movimento d'Arte Concreta) in 1948. Exhibitions of the Concrete Art of Zurich were organized in Germany and Switzerland in 1949 and, in collaboration with Bill, the most comprehensive display of this art movement ever before presented took place in Zurich in 1960: these exhibitions served to strengthen and provide impulses to the younger generation of artists. See also note 362. The founding of the Hochschule für Gestaltung in Ulm as the successor institution to the Bauhaus signified reconstruction and a new beginning after the years of the Second World War. The curriculum of the new academy and its departments of visual communication, product design, and industrialised construction concentrated exclusively on applied art. Until its closure in 1969 the Hochschule exerted a decisive influence on post-war design; Bill was the director of this institution from 1953 to 1956, and within this period he brought many distinguished visiting professors to the school. A further lecturer in Ulm – from 1954 to 1958 and in 1966 – was the philosopher Bense. See Hans J. Glattfelder, 'Alle origini dell'arte concreta', Belfagor, 6 (2007), 645-664 and Dietmar Gaderian and others, Concrete Art in Europe since 1945 (Berlin: Hatje Cantz, 2002).

[364] Bense, *Estetica*, pp. 71 and 96. 'Ciò che Bill chiama "concretizzazione" consiste nella rappresentazione di un "pensiero", in questo caso di un pensiero astratto, attraverso un modo adeguato di espressione. Il pensiero è in questo caso "una realtà artistica", come dice Bill, è "correaltà", come dovremmo chiamarla, e, come si dovrebbe aggiungere, è la "modalità della bellezza"; il "modo di espressione" consiste invece nella "relazione con la superficie", che, in quanto tale, si serve dei segni (punto rosso, superficie del quadro), privi in sé di significato'. Ibid., p. 96.

[365] Max Bill, 'Pittura Concreta', *Domus*, 206 (1946), 37-43, (p. 38).

questo sapere egli coordina e rende efficiente mediante le sue idee informatrici per creare immagini che promettono alla pittura un nuovo grande avvenire.[366]

Bill's work and the idea conveyed by Concrete Art, according to which relationships on canvas or in sculpture between aesthetic signs are nothing but the practical realization and the objective manifestation of abstract thoughts, are a useful tool for Bense to introduce his concept of 'correality' from a modal viewpoint as the way in which the artwork is ideated and expressed by the artist. According to him, the abstract thought of the artist can be considered a proper reality, to be precise an artistic reality, which becomes 'concrete' with the physical realization of the artwork itself (see Chapter 4). The capability to handle the concept of 'correality' implies the knowledge of different disciplines, from mathematics to physiology: as already discussed, Programmed Art greatly focused its attention on interdisciplinarity and the use of Bense's theories could only emphasize this concept.

Finally, what is important to highlight is the subtle *fil rouge* that links the research on the rational nature of the work of art with the artists' ambition of this period to 'conquer' space in order to make it an integral part of the art experience. In this regard, it is interesting to quote what Bill wrote in the catalogue of the *Konkrete Kunst* exhibition of 1960 where the artist claims that

Un quadro ha, oggi più che mai, una funzione spaziale esplicita. Esso è un centro di irradiazione, così come una sorgente di luce o una sorgente di calore. La differenza sostanziale consiste nel fatto che questa irradiazione proviene dall'organizzazione propria del quadro e quindi non deriva da una fonte di energia esterna rispetto all'opera d'arte.[367]

What emerges from this testimony is the need to understand 'correality' – the 'organizzazione propria del quadro' – as the way in which the work of art obtains the capacity to express itself in a complete manner and to assume, consequently, a spatial function.

3.2 Kinetics, Perception, and the Conquest of Space: The Role Played by Victor Vasarely and the Historical Avant-Gardes

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[366] Ibid., p. 43.
[367] Gillo Dorfles, *Ultime tendenze nell'arte d'oggi: Dall'Informale al Neo-oggettuale*, p. 203.

The research on movement, the art space, and the use of geometric figures, as analysed above, connects the Arte Programmata movement with other previous Italian groups such as the M.A.C. and, more generally, with the European concrete trends. Other artistic events that took place in the 1950s allow to widen the connections between the Italian kinetic movement and other main European trends of the period, but, above all, they allow us to connect groups like Gruppo T or N with some key figures of the historical avant-gardes of the early twentieth century. Two events that took place in 1954 and 1955 can be considered the link between the evolution of research on dynamism and visual perception in the 1960s and the innovations introduced by artists such as Duchamp or Moholy-Nagy at the beginning of the century.

In 1954 the M.A.C. became part of the French Espace Groupe founded in 1951 by the artist and architect Andrè Bloc (1896–1966).[368] The aim was to pursue an ideal of synthesis of the arts that unites architecture with the plastic capabilities offered by concrete artists.[369] Vasarely joined the group too: he can be defined to all intents and purposes as the precursor of the Optical Art trend. His research unites the abstract-rationalist currents of the beginning of the century and the concrete ones with the interest in perceptive processes without any kind of real movement.[370] The presence of Nicolas Schöffer (1912–1992), inventor of the first dynamic and cybernetic sculpture in history, must also be mentioned.[371] This union brings Italian artists into close contact with the figure of Vasarely, whose work can be defined as a starting point for Italian kinetic experiments. Indeed, both an attention towards the perceptual stimulation of the observer – which focuses above all on the identification of the different planes that constitute the work – and an attempt to create a dynamism inside the painting itself can be found in his works of the 1950s (fig. 53 and 54). His research was always based on the concrete tradition and the use of simple geometric shapes, without any kind of symbolic or analogical reference.[372] In Vasarely's paintings the observer is engaged to extricate himself/herself amongst the

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[368] *Movimento Arte Concreta 1948-1958*, ed. by Luciano Caramel, p. 21.

[369] Published on the magazine *L'Architecture d'aujourd'hui* in 1951, the Espace manifesto underlines how the synthesis of plastic arts and architecture could become the symbol of an evolved civilization and how it is to be sought in such a crucial moment for post-war reconstruction. Artists and architects together research for a kind of art that expresses itself in the real space and that responds to the modern man's functional needs. This new production is planned to be three-dimensional and the light acquires, then, great importance. This synthesis will develop a kind of art where colours and shapes are inextricably linked for their intrinsic and architectural qualities in an ideal expression of relationships and proportions. See 'Manifeste du Groupe Espace', *L'Architecture d'aujourd'hui*, 37 (1951), p. V.

[370] 'For Vasarely the notion of movement is inseparably linked with that of spatial illusion. It is from the union of these two elements that the plastic word develops […] Vasarely has embarked upon an illusionistic kinetic method which he believed to have richer and more durable qualities than the 'spectacular' effects of real movement or movement resulting from the spectator's change of position'. Popper, *Origins and development of Kinetic Art*, pp. 96-101.

[371] 'Schöffer's use of movement was already quite original. The great innovation was to make use of the power of electronics and the possibilities of cybernetics not only as a means of integrating the music with the rest of the work but also as a way of subjecting the mobile elements to the influence of external events. This was in fact the central motif of a subsequent work entitled *Cysp 1*, which displayed a remarkable range of movements. In accordance with the title, which stood for 'Cybernetic + Spatio-dynamisme', this sculpture was a right-angled construction that moved in response to the instructions of an electronic brain hidden in the base'. See Popper, *Origins and development of Kinetic Art*, p.135.

[372] *Arte Programmata e Cinetica 1953-1963, L'ultima avanguardia*, p. 143.

various perceptual illusions proposed: the observer is committed to reconstructing the progress and internal dynamics of the work through real perceptive gymnastics.

The research conducted by Gruppo T's artist Varisco can be related to Vasarely's production, especially analysing the series *Schemi luminosi variabili*, created by the Milanese artist between 1961 and 1968 (fig. 55 and 56). These artworks are made of a wooden band holding together two combined mirroring screens: one rotates while the other is fixed. The object is illuminated from the inside by a circular neon lamp. The public observes the continuous variation of the image, which is produced by the overlapping of screens and the mechanical programming of their rotation.[373] The use of motors helps to exacerbate the contrast between light and dark. Furthermore, the choice of specific elements in programmed schemes and times expands the spectrum of variations and delays the repetition of the image, keeping the observer engaged.[374] Here the painted geometric shapes and the illusory planes created by Vasarely are replaced by the light and a mechanized dynamism which also emphasizes the relationship between the formal variations proposed by the work and the idea of time. As for Vasarely or Munari, there is an evident perceptual game that underlines the different planes that constitute the work.

Vasarely represents a direct connection between concrete art and the works created by Gruppo N and G.R.A.V., that were more interested in the investigation of the illusory movement and in the optical effects given by the mobility of light.[375] For instance, it is possible to make a comparison between Vasarely's works and the research on virtual space carried out by Biasi. In some of his works belonging to the *Trame* series, the study of reticular visual structures gives to the observer the illusion that the surface of the work retracts in certain points, creating alterations on the surface (fig. 57). Vasarely's study on plastic kinetics and the role of space progressed after 1955: in these works, as in Biasi's *Trame*, painting and sculpture disappear as separate concepts to fuse themselves into a new artistic experience.[376] Vasarely's works began to involve contradictory perspectives where painting and sculpture come together for the development of 'a unique plastic sensibility in a variety of spatial situations'.[377] We can find in his canvases the illusion of protrusions and recesses similar to the ones in the works created by Biasi (fig. 58).

Vasarely's work offers the possibility to focus on another fundamental event in the history of European kinetics which can certainly be defined as a point of contact between the last avant-gardes

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[373] See http://www.reprogrammed-art.cc/library/40/Schema-luminoso-variabile-R.R.-66 [accessed 1 May 2021].
[374] *Arte Programmata e Cinetica 1953-1963, L'ultima avanguardia*, p. 142.
[375] One of the member of the G.R.A.V., Yvaral, was Vasarely's son. Ibid., p. 148.
[376] 'Vasarely's work has led many artists of the younger generation to undertake a purely optical study of movement, both in Europe – among the members of the *Nouvelle Tendance* for example – and in America [...]'. See Frank Popper, *Origins and development of Kinetic Art*, p.101.
[377] Ibid., p. 98.

tendencies born in the late 1950s and the first historical ones. The exhibition *Le mouvement*, organized in Paris in 1955 at the Denise René gallery by Vasarely, art historian and museum director Pontus Hultén (1924–2006), and art critic Roger Bordier (1923–2015), is regarded as the event that formally established the birth of the concept of kinetic art amongst critics.[378] The exhibition was divided into two sections: the first section presented artworks by authors who have addressed the theme of movement at the beginning of the century such as Duchamp or Moholy-Nagy, while the second part proposes works by contemporary artists such as Tinguely, Jesús-Rafael Soto (1923–2005), and Pol Bury (1922–2005). On the occasion Vasarely composed the programmatic text *Notes pour un manifeste (cinétism)*, also called *Manifeste Jaune*, where he focuses on pioneering themes fundamental for the development of kinetic art such as the idea of movement and the illusion of space-time offered by the innovative use of the screens, the role of science, and the interdisciplinary value of a new art as well as the new frontiers offered by the replicability of the artistic object.[379] The idea of 'motion and time' as a whole concept will come back in the first programmatic text of Gruppo T at the end of 1959 as one of the requirements imposed to art production by modern times. What is most noticeable about this manifesto is the very close relationship between the concept of a modern work of art and the possibilities offered by scientific disciplines, such as physics and chemistry, which can bring additional qualities to the work.[380]

Duchamp was also present at the exhibition *Le mouvement* as an exponent of the first avant-garde. As the critic Guido Ballo (1914–2010) states, Duchamp together with the Futurist Giacomo Balla, Alexander Calder, and Moholy-Nagy, was one of the first to face the problem of kinetics in the work of art.[381] The leaflet of the exhibition that contains Vasarely's manifesto included also an interesting section called *Petit memento des arts cinétiques* where the main phases of the evolution of the theory of kinetics in art are listed in chronological order.[382] Duchamp is mentioned several times, but the most important works with which he established his strongest relationship with kinetics are the *Rotative Plaques Verre* of 1920 (see fig. 59, 60, and 61), the *Rotative demi-sphère* (fig. 62) of 1925 and the *Disques visuels* or *Rotoreliefs* (fig. 63 and 64) of 1935. *Rotative Plaques Verre* is made up of five painted glass plates that rotate around a metal axis and appear to be a single circle when

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[378] Ibid., p. 95.
[379] 'L'ECRAN EST PLAN, MAIS PERMETTANT LE MOVEMENT, IL EST AUSSI ESPACE. Il n'a pas deux, mais quattre diménsions. Le 'mouvément-temps' illusoire de la composition pure, dans la nouvelle dimension offerte par l'ecran, et grâce à l'unité, devien mouvément réel. […] Donc nous possédons et l'outil, et la technique, et infin la science pour tenter l'aventure plastique-cinétique. […] Si l'idée de l'oevre plastique résidoit jusqu'ici dans une démarche artisanale et dans le mythe de la 'pièce unique' elle se retrouve oujourd'hui dans le conception d'une possibilité de RECREATION, de MULTIPLICATION et d'EXPANSION.' See *Notes pour un manifeste (cinétism)* in the exhibition leaflet. It can be consulted at https://www.collection-lemanifeste.com/fr/le-manifeste-jaune.html [accessed 1 May 2021].
[380] *Arte Programmata e Cinetica 1953-1963, L'ultima avanguardia*, p. 144.
[381] Ibid., p. 211.
[382] See https://www.collection-lemanifeste.com/fr/le-manifeste-jaune.html [accessed 2 May 2021].

viewed frontally at a distance of one metre.[383] *Rotative demi-sphère* is a wooden hemisphere with an asymmetrical series of painted concentric circles set on a machine mounted disk. When the disk was set to spin, viewers who followed the instruction to stand directly opposite to it and a metre away would perceive pulsating effects of advance and recession.[384] *Rotoreliefs* are a set of six double-sided discs meant to be spun on a turntable at 40–60 rpm. The two-dimensional *Rotoreliefs* create an illusion of depth when spun at the correct speed.[385] All three works must be acknowledged as a staple in the evolution of motion in art – especially when considering the innovations introduced by the Gruppo T – due to the presence of electric motors.[386]

As for some objects created by Gruppo T, these works operate on the blurred boundary between art, mechanical object, and playful object: in these works, in fact, all the mechanical elements are fully exposed to the spectator.[387] In regard to motion, Duchamp in his works experiments on two opposite concepts: the use of real and illusory motion. The real movement of the artwork is the essential premise for the other one. By means of the actual motion, which takes place at the beginning of the artistic experience, another type of movement comes to life which is the result of an optical effect, and that is perceived by the observer's eye. Different types of movements inevitably lead to spatial investigations. In *Rotative Plaques Verre* Duchamp experimented with the real and tangible idea of space because, depending on how the observer moves around the kinetic work, s/he will be able to perceive one circle if positioned frontally, five circles if positioned from an angular viewpoint, and five lines if positioned alongside the work. In *Rotative Demi-sphère* and *Disques visuels*, which must be experienced mainly from a frontal position, a new concept of three-dimensionality deriving from the time variable emerges. Indeed, it is through the actual movement of the work over time that the viewer's eye creates the third dimension, a new space for the development of the consequent illusory movement (advancement, recession, depth).

Space and time are therefore both already present in these artworks as variables in constant evolution. *Rotative Demi-sphère* and *Disques visuels* can thus be recognised as the precursors of a branch of Gruppo T's production. As an example, it is possible to identify a continuity of research between Duchamp and Anceschi considering for example the aforementioned *Strutturazione*

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[383] See https://artgallery.yale.edu/collections/objects/43792 and https://www.centrepompidou.fr/en/ressources/oeuvre/dS9Z3Wr [accessed 2 May 2021].

[384] See https://www.moma.org/interactives/exhibitions/2012/inventingabstraction/?work=85 [accessed 2 May 2021].

[385] https://www.guggenheim.org/blogs/findings/marcel-duchamps-rotoreliefs [accessed 2 May 2021].

[386] Here there is a curious comparison to be made between the *Rotorelief* series presented by Duchamp within the first edition of 'Edition MAT' in 1959 and De Vecchi's artwork *Miramondo*. The observers interacting with Duchamp's *Rotorelief* were encouraged to mount the different decorated disks on a bespoke concealed phonograph motor to obtain imminently reproducible kinetic and transformable products. Similarly, De Vecchi's artwork, presented at 'Miriorama 8', allowed the observer to choose between a series of different visors provoking different visual effects to monitor whatever they ware willing to watch. See *Multiplied: Edition MAT and the Transformable Work odf Art, 1959-1965*, ed. by Meredith Malone, pp. 83-4.

[387] Popper, *Origins and development of Kinetic Art*, p. 143.

cilindrica virtuale (see Chapter 2). For the French artist, the perceptual optical game gives the observer the possibility of perceiving the three-dimensionality and the evolving movement in space of an already existing form (the pattern of the painted hemisphere and the various motifs on the discs). In Anceschi's work, on the contrary, we witness the perception of three-dimensionality and of the movement of a new structure, a new shape which, however, does not exist when the work is quiescent. Anceschi's artwork can therefore be considered an evolution of Duchamp's one. The design and technological complexity of the programmed work allow the artist to experiment more, but the basic principle is the same: the desire to stimulate the observer with an optical illusion that also allows a reflection on the fluidity of space-time.

Whether Duchamp can be recognized amongst the first who attempted to create an active comparison between the idea of movement and the definition of space, the figure of Moholy-Nagy must be associated to the French artist's one as the continuation of such studies.[388] In 1922 the Hungarian artist wrote – along with the Hungarian critic Alfréd Kemény – a short manifesto for the magazine *Der Sturm* where he analyses the way in which the work of art must take possession of space and how the space can be defined as the point of contact between men and the machine/artwork.[389] The text – in English *Dynamic-Constructive System of Forces* – clarifies how the static principles of canonical art must be replaced by a dynamic principle, the basis of universal life. The artist seeks to overcome the static nature of modern materials and forms for a new type of art that is dynamic, alive, dominated by the relations between forces and where the material aspect has the mere task of acting as a medium for their development. As specified by Moholy-Nagy, the first artistic projects of this kind must be considered experimental: they will be regarded as a sort of devices designed to test the relationship amongst the human being, the space, and the static matter used to convey these forces. The final goal is very ambitious: the realization of a work of art that is finally free from any mechanical or technological limitation but guided entirely by dynamic forces.[390] Following Popper's lesson that defines this system of forces as 'the tension of the structure in physical space and the tension within the system', it is possible to highlight a strong connection between kinetics, the space, and the art object.[391] The theoretical manifesto of the Hungarian artist therefore represents the role played by the early twentieth-century avant-garde movements in guiding the artists

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[388] Even Moholy-Nagy is mentioned in the *Petit memento des arts cinétiques*: in 1922, in fact, as specified in the text, the Hungarian artist started to work on one of his most famous and innovative sculpture in terms of kinetics, the *Lichtrequisit einer elektrischen Bühne*, or *Light Prop for an Electric Stage (Light-Space Modulator)*. The artwork will be finished in 1930.

[389] László Moholy-Nagy and Alfréd Kemény, 'Dynamisch-Konstruktive Kraftsystem', *Der Sturm*, 12 (1922).

[390] 'We must therefore replace the *static* principle of *classical art* with the *dynamic principle of universal life*. Stated practically: instead of static *material* construction (material and form relations), dynamic construction (vital construction and *force relations*) must be evolved in which the material is employed only as *the carrier of forces*'. László Moholy-Nagy and Alfréd Kemény, 'Dynamisch-Konstruktive Kraftsystem', *Der Sturm*, 12 (1922).

[391] Popper, *Origins and development of Kinetic Art*, p. 124.

towards an idea of motion as well as an active, dynamic art space which is governed by the same rules that characterized nature: this consequently establishes the important role played by science in the development of a new type of art.

Moholy-Nagy proposed the idea of a work of art in which the material aspect has only the function of conveying dynamic forces. The work of art proves to be a rational and active concept that aims, through contact with other disciplines, to assume an important communicative role that connects the observer with the artistic object. Furthermore, for the Hungarian artist, the experience of art aims to raise the skills and awareness of those who take part in the event, revealing in this way the active role of the observer as well as a didactic purpose for art:

> Carrying further the unit of construction, A DYNAMIC-CONSTRUCTIVE SYSTEM OF FORCES is attained whereby man, hitherto merely receptive in his observation of works of art, experiences a heightening of his own faculties, and becomes himself an active partner with the forces unfolding themselves.[392]

In the book *Malerei Fotografie Film* [*Painting Photography Film*] of 1927 Moholy-Nagy's theory of dynamic forces is concretized with clear examples. In the section dedicated to the innovations brought by displays of lights projected with a reflector, the artist emphasizes how 'The essence of the reflected light play is the production of light-space-time tensions in colour or chiaroscuro harmonies and (or) in various forms by kinetic means, in a continuity of motion: as an optical passage of time in a state of equilibrium'.[393] As in the theoretical statements of the Gruppo T, the Hungarian artist uses new technological tools to generate kinetic spatio-temporal situations to be offered to the observer. In Moholy-Nagy's viewpoint, as already underscored for Duchamp, time is a crucial variable: it produces 'a state of increased activity in the observer, who […] is forced almost to double his efforts immediately in order to be able simultaneously to comprehend and to participate in the optical events'.[394] As in Duchamp's art we are witnessing the birth of fundamental concepts for programmed artists. Besides the close relationship between time and three-dimensionality, a new important concept emerges here: time and motion features train the mind of the observer, unable in this way to experience the work passively.

An artwork like *Rotolineare*, designed by Devecchi between 1961 and 1962, exemplifies the concept theorized by the Hungarian artist. *Rotolineare* is a horizontal tube of transparent methacrylate perforated by a series of metal segments. The tube is activated by a rotary movement that makes the

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[392] László Moholy-Nagy and Alfréd Kemény, 'Dynamisch-Konstruktive Kraftsystem', *Der Sturm*, 12 (1922).

[393] László Moholy-Nagy, *Painting Photography Film* (London: Lund Humphries, 1969), p. 23.

[394] Ibid., pp. 23-4.

segments slide, without slipping, thanks to the stoppers placed on their tips. The segments flow progressively by gravity. The audience observes the rhythmic sequence of the falls, accompanied by the noise caused by the segments (fig. 65).[395] The observer, during the pre-established kinetic sequence, is simultaneously engaged in comprehending the operation of the machine and following its hypnotic movement that invades the space by sliding his/her eyes vertically to observe the fall of the segments and horizontally to follow the general movement of the whole series of segments along the tube.

Moholy-Nagy thought that art has the fundamental and necessary task of establishing new relationships that can lead to the stimulation of as many functional systems as possible of an individual. Art helps human beings to complete themselves because it guides them to implement the use of all their biological systems. Human beings, in his opinion, reach the peak of their potential when their functional systems are pushed to the limit: 'Art attempts to establish far-reaching **new relationships** between the known and the as yet unknown optical, acoustical, and other functional phenomena so that these are absorbed in increasing abundance by the functional apparatus' [bold in original].[396] In order to obtain such an ambitious aim it is therefore necessary to create artworks that take advantage of different forces at the same time in order to stimulate diverse apparatuses.

An example of the use of light, space, time, and movement in Moholy-Nagy's production is the artwork *Lichtrequisit einer elektrischen Bühne* [*Light-Space Modulator*] (fig. 66 and 67). Although the work still does not present any reference to a specific programming activity, it already shows significant elements of innovation that make it a precursor of the machines created by Gruppo T. *Lichtrequisit einer elektrischen Bühne* can be described as a 'moving sculpture, placed on a circular base, with three distinct spatial cells to allow greater complexity of movement. It is made of polished metal, which reflects the light'.[397] The first approach to the artwork stimulated the observer from multiple perceptual viewpoints simultaneously with diverse movements, patterns, and lights. The first cell, consisting of rectangular pieces of metal, is characterized by an irregular undulatory motion, while the second cell, with perforated metal discs, moves up and down. The third cell is constituted by a glass spiral that turns and produces a virtual conic volume.[398] This object can be appreciated from every angle by the observer who turns around it and can perceive the sounds produced by its movement. In addition to the visual and auditory stimuli offered by the object itself, what most characterizes the sculpture is its interaction with the space that surrounds it. Thanks to the use of polished metal, transparent material and perforated parts, the machine produces changing light effects

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[395] See http://www.reprogrammed-art.cc/library/87/Rotolineare and http://www.gabrieledevecchi.it/opera.php?idO=14 [accessed 3 May 2021].
[396] Moholy-Nagy, *Painting Photography Film*, p. 30.
[397] Popper, *Origins and development of Kinetic Art*, p. 125.
[398] Ibid., pp. 125-6.

that can be admired on the walls around the sculpture (fig. 66).[399] As in Duchamp, the importance of the space where the observer can enjoy the artistic experience has to be highlighted in this work too. Moreover, the production of playful light effects can be compared to Munari's research on kinetics and lights he conducted with the realization of *Concavo-convesso*.

To conclude this parenthesis on Moholy-Nagy, it is appropriate to make a stylistic comparison between one of the most famous works of the Hungarian artist, *Nickelplastik mit Spirale* [*Nickel Sculpture with spiral*] (fig. 68), and *Strutturazione fluida* by Colombo (see Chapter 2, section 2.2.2). Both works propose a kinetic and spatial development of a belt element. Although Moholy-Nagy's work is not powered by a motor, its kinetic power and its three-dimensional development in space are perfectly perceptible by the viewer who is brought to follow the evolution of the nickel belt's folds with his/her eyes. Colombo, with his work, seems to have resumed the study on this plastic form begun in the 1920's by Moholy-Nagy to adapt it to more modern programmed criteria. In fact, in addition to the presence of a motor that physically moves the belt sinuously, what truly distinguishes Colombo's work from that of Moholy-Nagy is the element of chance, that lies in the unpredictability of the subsequent movements of the belt. This work confirms once again that the studies conducted at the beginning of the century on industrial materials, and on the concepts of space and time had an incredible influence in the development of subsequent artistic theories in the second half of the twentieth century.

3.3 The Role of Azimut/h: Formal Similarities and the Role of the Observer

1959 is a crucial year for avant-garde Italian art: between 1958 and 1959 the Milanese artist Manzoni began his artistic association with Bonalumi, exponent of the Pittura-Oggetto tendency (see Chapter 2, section 2.1.1), Castellani, and members of the German group Zero, who were looking for a new type of art that surpassed the canons of painting.[400] In 1959, the Azimuth magazine was founded by Manzoni (only two issues were published between 1959 and 1960) as well as the Azimut gallery, a meeting point for many artists of the time whose aim was to compare themselves with the most avant-

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[399] *The machine, as seen at the end of the mechanical age*, ed. by K.G. Pontus Hultén, p. 138. Popper added that 'in effect, the power of the work depended more on the reflection than on the original'. Frank Popper, p. 127.

[400] It should be mentioned that Manzoni, before abandoning classic painting to research for a purer and metaphysical concept of art, exhibited between 1957 and 1958 with the group of Nucleari, collaborating also to the writing of their magazine, *Il Gesto*. The Movimento Nucleare incredibly inspired Gruppo T with its art, programmatic texts and references to science and nuclear painting (see Chapter 2).

garde European trends.[401] In eight months of life, between 4 December 1959 and 21 July 1960, the gallery gave birth to thirteen exhibitions, many of which featured artists presented in the magazine. The influence of Azimut on the T and N groups is justified above all by the fact that, on several occasions between 1959 and 1960, some members of the two groups exhibited at the Azimut Gallery, with Manzoni himself.

Four are the Azimut exhibitions to be noted for their importance.[402] The first collective display took place between December 1959 and January 1960 at the Azimut gallery with artworks by Anceschi, Boriani, Devecchi, and Mari for Gruppo T, Massironi for Gruppo N (not yet officially formed), the painter Alberto Zilocchi (1931–1991), and Dadamaino (1930–2004) as members of the Pittura-Oggetto trend.[403] After this exhibition Manzoni definitively separated his career from Gruppo T due to the substantial differences in terms of perspectives, while maintaining a solid relationship with Gruppo N.[404] Another collective show was hosted at the Azimut Gallery between February and March 1960 where Massironi exhibited along with Günther Uecker (1930) of the German opto-kinetic group Zero, Herbert Oehm (1935), and Ira Moldow. The display symbolizes the closeness of Gruppo N and Zero as well as the interest in vibrant optical-luminous artworks.[405] The third collective display took place between May and July 1960, again at the Azimut Gallery, and included amongst the participants Biasi, Landi, Massironi for Gruppo N, Bonalumi and Dadamaino as well as Castellani and Manzoni for Azimut.[406] The last collective display that holds interest regarding the relations between Manzoni and the Italian kinetic avant-garde is the one carried out in June 1960 that brought together representatives of the Gruppo N, Dadamaino, Castellani, Manzoni, the French artists of Motus (the future G.R.A.V. group) and Heinz Mack (1931), another exponent of the Zero group. Two other exhibitions in Padua and Rome showed Manzoni's interest in the Gruppo N production: the first took place at the Circolo del Pozzetto in April 1960 and saw the participation of Biasi, Castellani, Manzoni, Mack, and Massironi; the second one, peculiar for its subject matter as the objects exhibited

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[401] Luca Massimo Barbero, 'Azimut/h continuità e nuovo', in *Azimut/h continuità e nuovo*, pp. 19-41 (p. 26). The magazine and the gallery have two different spelling.

[402] 'Cronologia' in *Azimut/h continuità e nuovo*, pp. 120-1.

[403] The exhibition took place at the Galleria Azimut in Milan from 22 December 1959 to 3 January 1960 with the following artists: Giovanni Anceschi, Davide Boriani, Enrico Castellani, Gianni Colombo, Gabriele Devecchi, Dadamaino, Enzo Mari, Manfredo Massironi from Gruppo N, Piero Manzoni, and Alberto Zilocchi. Source: http://archiviodadamaino.it/documenti/ [accessed 2 October 2018].

[404] Luca Massimo Barbero, 'Azimut/h continuità e nuovo', in *Azimut/h continuità e nuovo*, pp. 19-41 (p. 36). Giorgio Zanchetti commented the fact underscoring how '[…] La radicalità della sperimentazione cine-visuale, nel reagire all'individualismo informale, si pone in contrasto anche con l'appropriazione panica del reale caratteristica del gesto di Manzoni […]'. See Giorgio Zanchetti, 'Oltre l'Informale' in *Arte in Italia*, pp. 279-98 (p. 285).

[405] Francesca Pola, *Piero Manzoni e Zero: Una regione creativa europea* (Milan, Electa Mondadori, 2014), p. 66.

[406] In May 1960 Manzoni also hosted the French group Motus at the Azimut gallery. It later changed its name to Groupe de Recherche d'Art Visuel (G.R.A.V.), and its exhibition story will be intertwined with the Italian programmatic groups one due to the similarity of their research perspectives.

were all foldable, reducible, pocket-sized, modular, and transportable, took place at the Galleria Trastevere in October 1960 and it was attended by Biasi, Bonalumi, Dadamaino, and Manzoni.[407]

The artists gravitating around the Azimut gallery had one goal in common: the zeroing of the image in favour of a new and radical concept of pictorial surface. These artists pursued the idea of a neutral monochromatism of the work of art, but they also urged the inclusion of a reflection on space-time and on the relational involvement of the viewer in art production.[408] Manzoni believed that the perceived creative impasse was overcome, and art had acquired its total freedom. In the programmatic text *Libera Dimensione* the artist expressed the concept clearly: 'gli ostacoli dello spazio, le schiavitù del vizio soggettivo sono rotti: tutta la problematica artistica è superata'.[409] The total absence of any artistic problem inevitably leads to an absence of functionality in modern art. Castellani himself, in the essay *Continuità e nuovo* stated that:

> Iniziando a considerare l'opera d'arte come oggetto autonomo a sé stante le nega implicitamente la funzione del rappresentare, e dichiarandola oggetto concreto invalida e rende ovvie anche le tesi di coloro che pur a lui rifacendosi tendono a considerare il quadro o la scultura zone di concretizzazione di idee preformulate.[410]

Therefore, the work of art no longer has the function of representing reality, nor giving shape and meaning to ideas. However, a strong connection between Azimut and Arte Programmata artists can be found in the focus on the temporal dimension of the works of art. Castellani in fact defined time as 'sola dimensione concepibile, metro e giustificazione della nostra esigenza spirituale'.[411] Even in this case, however, some distinctions must be made between the concept of time for the T and N groups and for Azimut members. In Manzoni's opinion, in fact, the time of the work of art is an unchanged present that does not project itself into the future, but remains constant and stable.[412] The artwork in this infinite present-day state relates to the observers simply for what it is and they

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[407] See Archivio Dadamaino https://archiviodadamaino.it/esposizioni/mostre-collettive/ [accessed 30 November 2019]. And also *Alberto Biasi: Opere dal 1959 al 2013*, ed. by Marco Meneguzzo, (Lugano, Galleria Allegra Ravizza, 2013). Even Gruppo T artists dedicated themselves to the creation of small, manageable, and interactive works of art for their 'Miriorama 8' exhibition that was organized by Munari at the Galleria Danese in Milan. (see Chapter 2).

[408] Francesca Pola, 'La costellazione della nuova "concezione artistica". Azimut/h epicentro della neoavanguardia europea', in *Azimut/h continuità e nuovo*, pp. 123-143 (pp. 124-5).

[409] Piero Manzoni, 'Libera Dimensione', *Azimuth*, 2 (1960).

[410] Enrico Castellani, 'Continuità e nuovo', *Azimuth*, 2 (1960).

[411] Ibid.

[412] '[…] Manzoni […] Il suo problema è infatti quello di non proiettarsi al di là di se stesso e del tempo in cui vive, vuole solo espandersi ed esprimere il suo presente, vuole progettarsi solo come se stesso, con il suo corpo e le sue idee.' See Germano Celant, *Su Piero Manzoni* (Milan: Abscondita, 2014), p. 29.

authenticate the ontological value of the work of art with their presence.[413] For Gruppo T instead – in a more evident way than for the Paduan group – time is not fixed in a constant present, but it is a dynamic entity that contributes to the development of multiple variables within the art experience. The electric motor and the illusory dynamism are therefore strongly in contrast with the role played by kaolin in Manzoni's canvases, a substance capable of fixing the materiality of the painting in a constant present-day.

The most famous series of works by Manzoni is in fact the *Achrome*, literally 'colourless'. The *Achromes* were made by Manzoni from 1957 until his death and are significant for the purposes of this research because of their formal similarity, as we shall see later, with some works made by Colombo and, in general, to introduce a reflection on the concept of module as a constituent unit of a work of art. The *Achromes* are made from industrial fibres and cotton, polystyrene or wool, glass, leather, felt, raw canvas, or even plush. In many cases the works are immersed in kaolin, a liquid ceramic material, before being mounted onto the frames. Kaolin blocks the work in a condition between materiality and immateriality, giving life to a total space, frozen and neutralized by the canceling and uniforming presence of white kaolin which also fixes the temporality of the work to an eternal present.[414] Besides kaolin, what stylistically characterizes the *Achromes*, in most cases, is the presence of either a grid structure or an ordered organization in the canvas which allows the artist to freeze the artworks even more giving the possibility to the observer to reflect about the new role of the work of art, and about its eternal space-time (fig. 69).[415]

Another noticeable point of contact in the relationship between Arte Programmata and the artists gravitating around the Azimut group is certainly the attention towards the conception and the theory of the work of art. For T and N artists alike it is necessary to plan permutations and sequences to stimulate the observer from a perceptual viewpoint and develop a 'coscienza del vedere', in the same way the creation of the work of art for Castellani and Manzoni is planned, studied, and sought to generate a sense of total emptiness in the observer.[416] Castellani's nails[417] and Manzoni's kaolin works aim to invade the observer's mind with light: nothingness is all-encompassing and has the

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[413] 'La moralità diventa così azione estetica ed esperienziale. La realtà si identifica con la realtà estetica. Per questo motivo Manzoni inizia dalla tabula rasa, dalla forma zero della pittura, dal quadro bianco, dall'*achrome*, vuole entrare nel vuoto'. Ibid., p. 12.

[414] Celant, *Su Piero Manzoni*, p. 134 and Antoon Melissen, 'La trasformazione della realtà. Azimut/h: tra astrazione radicale e poetica dell'oggetto' in *Azimut/h continuità e nuovo*, pp. 145-157 (p. 153).

[415] 'Gli Achromes sono unici e diversi, ma potenzialmente simili e infiniti, si basano su una continua ed estenuante analisi del silenzio e del vuoto, dell'assenza del gesto e della figura'. See Celant, *Su Piero Manzoni*, p. 96.

[416] Ibid., pp. 107-8.

[417] From 1959 Castellani's art stabilized stylistically: his monochromatic canvases began to be animated by extroversions caused by the presence of nails. These canvases are characterized by regular sequences of reliefs and introflexions combinable to infinity, organized according to the combinatorial study of numbers. The artist thus gave life to a style that declined in endless variations. Federico Sardella, 'Enrico Castellani prima e dopo Azimut/h', in *Azimut/h continuità e nuovo*, pp. 159-167 (p. 164).

purpose of inevitably bringing observers to reflect on the pervasiveness of art even in its more extreme meaning. The artwork baffles those who experience it, and observers can do nothing but live it for what it is as a whole.[418] Manzoni declares his enthusiasm for the value of a total white surface in the programmatic text *Libera Dimensione*, published in the second issue of the Azimuth magazine in 1960:

> […] Perchè non liberare questa superficie? Perché non cercare di scoprire il significato illimitato di uno spazio totale, di una luce pura e assoluta? […] La componente artistica che si avvale della composizione, della forma perde qui ogni valore: nello spazio totale forma, colore, dimensioni non hanno senso; l'artista ha conquistato la tua integrale libertà: la materia pura diventa pure energia […] Una superficie bianca che è una superficie bianca e basta (una superficie incolore che è una superficie incolore) anzi, meglio ancora, che è e basta: essere (e essere totale è puro divenire).[419]

Even if completely empty, the surface of the painting, as Dorfles defines it, is a 'strutturazione dinamica' and, above all, it is a starting point for the active participation of the observer. On the canvas Manzoni and Castellani remove any personal and emotional trace of the artist (so evident in the Informale artistic production) to generate in this way 'processi formativi autonomi e autoproducenti': the formative attitude got Manzoni close to Arte Programmata groups that believed in the educational value of the artistic experience.[420] The presence of a heavy layer of kaolin and chalk that characterizes the *Achromes* prevents and blocks any emotional aspiration on the artist's part. What emerges is only the repeated or varying structure below the white surface offered using the underlying objects or materials. Although different, the Azimut artists and the Arte Programmata groups share the idea of a lack of completeness of the work if deprived of the necessary interaction of those who experience it. Even a surface without any apparent reference has its own design and its own specific purpose. As the critic Celant states in his theoretical testimony on the importance of Manzoni's artistic research, the *Achromes* represent 'un puro linguaggio visivo attraverso cui l'arte parla di sé'.[421] The use of the a-chromatic and modulated canvas are all elements designed to instruct the observer on the totalizing sense of art. As Arte Programmata is based on the variation and perturbation of a given elementary kinetic process, in the same way Azimut artists use elementary structures and modules to convey the observer's reflection on the infinity and totality of the

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[418] Giorgio Zanchetti, 'Oltre l'Informale' in *Arte in Italia*, ed. by Luciano Caramel, pp. 279-98 (p. 282).
[419] Piero Manzoni, 'Libera Dimensione', *Azimuth*, 2 (1960).
[420] Dorfles, *Ultime tendenze nell'arte d'oggi: Dall'Informale al Neo-oggettuale*, pp. 85-6.
[421] Ibid., p. 134.

artwork.[422] This concept is very well expressed by Castellani who in the second issue of the Azimuth magazine states that:

> Il solo criterio compositivo possibile nelle nostre opere sarà quello non implicante una scelta di elementi eterogenei […] ma il solo che attraverso il possesso di un'entità elementare, linea, ritmo indefinitamente ripetibile, superficie monocroma sia necessario per dare alle opere stesse concretezza di infinito.[423]

In the programmatic text for 'Miriorama 2' of January 1960 written by Boriani (see Chapter 2, section 2.2.1), the elementary components and their development in repeated and varied structures have the crucial role of activating the work of art, provoking reflection in the observer on the becoming of space-time. In the same way, in Castellani's words, the use of the structural elements of the work rises to take the idea of temporality to extremes, referring to the concept of infinity.

References to modular structures and variations of shadows and lights are not only present in Castellani and Manzoni. The German group Zero, in fact, close to the Azimut environment, in addition to the reflection on the surface purity includes in its research elements of commonality with Gruppo T and N. Uecker, for example, stated that in his works he wanted to establish 'uno schema strutturato di relazioni con l'aiuto di […] elementi per mettere in moto vibrazioni che ne disturbino e irritino l'ordine geometrico'.[424] Already in 1961, after a long creative process begun in 1957 with monochrome canvases attached to the outer edges with nails at regular intervals, the nails he used in his art research completely covered the surface of his works. The surface thus became rich in modulations of light, shadows, and vibrations.[425]

From a stylistic and formal viewpoint this characteristic feature of his production can be compared to *Rilievo ottico-dinamico* realized by Gruppo N in 1962 for the Olivetti exhibition in Milan. On a white square surface, a series of black metal segments are arranged according to equidistant points of a square grid. Each segment has its own different and progressive inclination

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[422] It could be interesting to analyse the choice of Gruppo T to use a *Linea* among the various works created by Manzoni to pay homage to him during the collective exhibition 'Miriorama 1' (see Chapter 2). Nevertheless, it is not possible to know if the artwork was selected by Manzoni or Gruppo T. Manzoni's *Linee* are lines drawn by the artist with ink on paper rolls and inserted in a cardboard tube whose label precisely indicates the length of the aforementioned line and the date of execution. Again, as for the *Achrome*, it is a piece of art where Manzoni stopped and blocked time and space, defining a dimension and closing it into a cardboard tube, selling to the public an idea, a concept. What can be supposed to have fascinated the members of Gruppo T in the choice of this work is the undeniable reflection on the variables of space and time in an art object. It is intended to relate conceptually with the observers, forced them to think about the spatial and temporal value of the line enclosed in the cardboard tube.

[423] Enrico Castellani, 'Continuità e nuovo', *Azimuth*, 2 (1960).

[424] Melissen, 'La trasformazione della realtà. Azimut/h: tra astrazione radicale e poetica dell'oggetto' in *Azimut/h continuità e nuovo*, pp. 145-157 (p. 150).

[425] Ibid.

according to the section of the object. The outer part of the segment is movable and, while the square grating remains fixed, by moving the segments, variations of the total image are obtained.[426] Whereas for Gruppo N the metal segments are planned and arranged in such a way as to be modified and manipulated through the observer's tactile interaction, in Uecker's artworks metal segments or nails measure the surface of the work, but are trapped in an eternal rhythm that cannot change (fig. 70 and 71). Certainly, as for Gruppo N, Uecker tried to establish a dialogue and a relationship with the observer, but the disturbance of the geometric order does not have the same powerful interactive influence as the Italian collective programmed piece of art. However, from a stylistic point of view there is an undeniable bond between the works that exemplifies the artistic and creative *fil rouge* enshrining the Italian and the German groups in those years: it is clearly possible to mark a line of continuity between them. In both, as compared to Manzoni's and partially Castellani's radicalism, we can see a connection among three elements: the dynamism that springs from the vibrating surface of the artwork, the active role of light emanating from it, and the observer who stands in front of it. The artist from Zero group who is perhaps most interesting concerning this comparison is Mack, who worked extensively with materials that can destabilize those who look at them, like aluminium (fig. 72).

As already pointed out for Uecker's metal segments, the work of the artists linked to the Azimut environment is blocked in an infinite space-time dimension without any immanent reference, a feature that is essential for the Italian groups instead. Thus, just as the inspiration of the Zero group is the basis for a further Gruppo N's research on tactile stimulations, on the spatial interaction of the work of art, and on the temporality of the artistic experience, so are the works of Mack for the Gruppo T. Mack's artworks, first made on canvas through painting and then with the use of aluminium, have the purpose of researching the idea of vibration. The reliefs consist of a sheet of metal printed with repetitive patterns or basic elements – albeit hand-moulded and slightly irregular – of curves and lines. The light that is reflected on the surface of the aluminium produces bright spots and shadows that change according to the environmental conditions and the movement of the viewer, giving rise to a game of changing shapes with no perceptible beginning or end. The interactions between elements such as the line, the relief, and the suggestions of the material create virtual vibration, pure movement, and perceptual creativity. This vibration cannot be found in nature, is directionless and does not have any purpose. Since this abstract notion of movement is disconnected from natural space, it is also removed from the normal conception of time[427]: he defined vibration as an expression

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[426] *Programmare l'arte: Olivetti e le neoavanguardie cinetiche*, ed. by Marco Meneguzzo, Enrico Morteo, Alberto Saibene, p. 68.
[427] Marina Isgrò, 'The Meanings of Movement in the Work of Zero, Gruppo T, and Gruppo N', Italian Zero/Cross Reference (Brescia: Kanalidarte, 2014), pp. 58-83 (pp. 60-1).

of continuous movement. The absolute infinity of the vibratory motion is therefore emphasized as an essential requirement for Zero artists.

Boriani, in 1959, developed an artistic project - repeated and modified over the years until 1994 - which from a formal and stylistic point of view has evident similarities with the aluminium works by Mack. 1959 artwork from Boriani is called *Superficie Magnetica n. 4* and is a wooden surface subdivided into 24 steel geometric modules whose aim is the perceptive stunning of the observer. However, what distinguishes it from the works of the Zero group is the inner dichotomy of programming and chance (fig. 73). In this piece the participation of the observer and the consequent continuous random evolution of the work is programmed through the particular physical structure of the work, as it was the case for *Rilievo ottico-dinamico*. In the first version of *Superficie Magnetica n. 4* – displayed during 'Miriorama 2' – the audience held a magnet that triggered the rotation of the 24 rectangular modules made of metal and polyurethane foam. At the exhibition 'Miriorama 7' the magnet was mounted on an underlying wheel.[428] The unexpected rotation of the metal plates, the reflection of light on them, and the participation of the viewers are all elements that undermine the fundamental idea of the artists gravitating around Azimut about the constant immutability of the artistic surface, without any evolution that acted as stimuli for the viewer's reflection. Boriani had a more immanent approach: he clarified the space of the artistic experience, enhanced the flow of time through the dynamism of the surface whose modifications cannot be programmed in advance, and proposed a work that will never have fixity.

Manzoni and Castellani distanced themselves from the Gruppo T after the first collaborations for the launch of the Azimut gallery, due to a radical difference of views. In fact, the para-scientific and technological vision of the group contrasted with the poetic vision shared by Manzoni and Castellani, halfway between the Informale style and a geometric rigorism. Moreover, Castellani himself defined the two groups as irreconcilable because technology had the risk of distracting artists from the necessary subordination to the artistic language, proposing sterile research devoid of artistic lyricism.[429] However, a general and shared desire for a radical transformation of the concept of a work of art and the relative role of the observer is perceptible. The ideals that unite all these artists demonstrate the influence that the group of artists operating under Azimut had for groups T and N. The art historian and critic Udo Kultermann (1927–2013) seemed to notice this new artistic necessity when, in 1960, in the second issue of the magazine Azimuth he wrote:

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[428] *Davide Boriani: Arte cinetica, programmata, interattiva*, p. 112.

[429] Francesca Pola, 'La costellazione della nuova "concezione artistica". Azimut/h epicentro della neoavanguardia europea', in *Azimut/h continuità e nuovo*, pp. 123-143 (pp. 137-8).

Meta prima dell'artista è dunque la mobilità del quadro, che si sprigiona dal quadro, elevata sul puramente meccanico dell'immaginazione artistica, che aiuta a creare uno spazio in cui l'osservatore penetra. Questo non ha più niente a che fare con 'profondità spaziale', ma piuttosto con 'attività spaziale', o addirittura con un'aggressione spaziale, si muove verso l'osservatore e lo fa partecipe del gioco mutuo, che richiede un contributo del quadro e dell'osservatore. [...] Nei quadri dei nuovi pittori partendo dall'esecuzione tecnica, è possibile fare dei confronti con le forme alterate della vita moderna, con il metodo di lavoro sperimentale dei fisici che cominciano dal concetto di antimateria, con il sistema di produzione dell'industria moderna, che ha introdotto dei cervelli elettronici per vasti processi di lavoro [...].[430]

This text, entitled *Una nuova concezione di pittura* – focusing the attention on the year in which it was published – almost certainly represented an important starting point for the Italian artists in the investigation of the discussed themes. The idea of a 'attività spaziale', an area of confrontation and exchange where the observer can become aware of his/her role and that could also generate an interdisciplinary reflection is precisely the essence of the programmed research that was developing in those months.

Although in Manzoni there is no reference to the physical interaction of the work of art with the observer, it is possible to speculate that the totalizing experience offered by his works also includes – due to the materials chosen – a potentially tactile stimulation. Whoever enjoys the sight of some of his *Achromes*, especially the ones made of cotton, wool, felt, and even plush, is inevitably attracted by the possibility of being able to touch the monochrome material affixed to the canvas. Visitors follow it with their eyes and indicate it with their hands, but it is either blocked on the surface in a grid structure that modulates and freezes it, or simply attached, white and static (fig. 74).

Colombo can perhaps be said to welcome Manzoni's provocation by unblocking the purity of his *Achromes* transforming them into pulsating structures. While maintaining the element of the grid, in his different version of *Strutturazione pulsante* Colombo rationalizes the surface of the *Achromes* by replacing the material chosen by Manzoni with simple dowels. However, the surface is no longer just a white plane but an 'attività spaziale' where the work, based on programmed kinetic variations, stimulates the eye of the observer. *Strutturazone pulsante* is a monochromatic wall of identical Styrofoam blocks arranged in a regular grid. An electromechanical device is set on the back, causing the protrusion of several points of the surface according to a random sequence. The continuous and simultaneous motion of the structure surprises the audience through ever-changing visual and

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[430] Udo Kultermann, 'Una nuova concezione di pittura'*, Azimuth*, 2 (1960).

perceptual conditions.[431] Through the programming of the movements of the Styrofoam tiles, the relative engagement of the observer who is obliged to relentlessly follow the changes in the piece surface, and the chiaroscuro game that always transforms the perception of the work, Colombo managed to unlock the infinite stillness of the *Achromes* created by Manzoni while taking inspiration from them at the same time (fig. 75 and 76). As the art historian Francesco Poli underlines, Colombo pushes the observer to 'practice' the work from a tactile point of view: the observer is tempted to touch the Styrofoam tiles to perceive the different thicknesses and to better gather the internal dynamism of the surface.[432] It is a sort of imaginary tactile dimension that can also be hypothesized when experiencing the *Achrome* production, but which Colombo – thanks to the space-time flux of the work – makes more intense.

This desire to comprehend the work through touch starting from rectangular modules and a rigid grid structure of the surface of the work was addressed by Colombo in the work *In-Out* of 1959. These are tactile patterns that the viewer is urged to touch. The pressure of the fingers affects the configurations variables that the object proposes, developing a sensitive perception that leads to a sort of complete awareness of the object that is crossed by the body (in this case only the hand) of the observer.[433] The work is rigidly planned to be enjoyed by the observer, to stimulate him/her from a perceptual and sensory viewpoint, and to make him/her live an artistic experience that can be radically different every time, but that aims to raise awareness on concepts such as the flexibility and the rigidity of the artistic object. The viewers moving away from the work literally see themselves on the surface of the work, the groove left by their hands is the proof of a truly open and dialoguing work of art (fig. 77 and 78). Whilst in Manzoni the element of the grid blocks the narrative component of the picture, in Colombo it has the opposite value. Celant significantly defines Manzoni's surfaces as 'puro significante […] La cosa o il quadro si definisce in sé, nel materiale che la fa essere'.[434] On the one hand Manzoni's object defines its existence with its very monochrome material surface; on the other hand Colombo through the programming of the movement and the dialogue with the onlooker reveals that the work of art has a high communicative power that is expressed through a flow of information consisting of aesthetic signs (see Chapters 1 and 4).

The reflections made so far about the relationship between Arte Programmata groups and Azimut artists find their conclusion and perfect synthesis in Meneguzzo's words which in the essay 'Ti con Zero' identifies 'the achievement of a working methodology of investigation' as a common

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[431] http://www.reprogrammed-art.cc/library/30/Strutturazione-pulsante [accessed 4 May 2021].
[432] See Francesco Poli, 'Gianni Colombo e l'arte degli ambienti tra Europa e America', in *I Colombo: Joe Colombo (1930-1971), Gianni Colombo (1937-1993)*, ed. by Vittorio Fagone (Milan: Mazzotta, 1995), pp. 271-278 (p. 275).
[433] *Gianni Colombo: Il dispositivo dello spazio*, ed. by Marco Scotini (Milan: Skira Editore, 2006), p. 16.
[434] Celant, *Su Piero Manzoni*, p. 131.

goal for them.[435] The artists of these years, therefore, through opposition to and emancipation from the Informale movement, which symbolised the chaotic post-war human condition of the 1940s and of the first half of the 1950s, proposed not just a new style, but a new method, a new approach to art making that, especially for groups T and N, has an important educational and didactic value on the observer's perceptive potentialities.

Although Manzoni's and Castellani's aim was to focus their research on a new definition of the concept of artwork rather than highlighting the prominent role of the observer, their activity partially sheds light on the observer's figure in contemporary artistic dynamics. Although no dynamism can be found in Manzoni's works (real or illusory) that legitimizes the observers' participation in the artistic experience, they are however very significant for the avant-garde and metaphysical vision of the Milanese artist. For Castellani, obviously, this observation is less significant, as the idea of making the canvas project forward with nails inevitably produces a planned vibration on the surface of the work that even partially manages to capture the observer from a perceptual viewpoint, bringing her/him closer to the group of Paduan artists. Nevertheless, Castellani's nails exploit lights and shadows in order to sensitize the pictorial surface making it rhythmic, always equal to itself, differently to what happens in the works created by Gruppo N where a dynamic and casual feature is always present (fig. 79).[436] The presence of the observers is fundamental because it is only through their attendance that they give authority to the work of art: the observer's artistic experience is necessary to confirm the idea of absolute emptiness that the artwork generates. This theory is valid above all for Manzoni, while the German group Zero shows a more structured attention for an artistic experience deliberately and actively made possible by the observer.

Conclusion

This chapter did not aim to focus only on the stylistic aspects underlying Arte Programmata, but also to trace the origins among the artists of their interest in the observer's presence and the consequent evolution of the concept of art experience. Arte Programmata, from a stylistic point of view, is fully affected by the concrete influence shared in Italy by the M.A.C. movement and deriving from the abstract lesson of the early 1900s. The use of geometric and elementary forms links the T and N groups to the Italian abstract tradition which was contrasting the prevailing Informale style of the second half of the 1940s. Munari and Vasarely with their research on the combination of abstract geometric forms and dynamism (real for the Italian artist and virtual for the French painter), were

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[435] Marco Meneguzzo, 'Ti con Zero', in *Zero: 1958-1968 tra Germania e Italia*, ed. by Marco Meneguzzo and Stephan von Wiese (Milan, Silvana Editoriale, 2004), pp. 39-45 (p. 41).
[436] Federico Sardella, 'Enrico castellani prima e dopo Azimut/h', in *Azimut/h continuità e nuovo*, pp. 159-167 (p. 163).

fundamental points of reference for these young Italian artists. Munari, again, influenced the young avant-gardists also in relation to the playful aspect of kinetics in art.[437] Furthermore it is possible to find in the almost contemporary Azimut group a point of contact with Arte Programmata that did not lie only in the sharing of exhibition experiences, but which is rooted in a particular attention given to the designing phase and to the relation between the work of art and the temporal dimension.

However, what it is necessary to highlight here more emphatically is the link that Arte Programmata has with the avant-garde movements of the first decades of the last century: Arte Programmata is the end point of the research conducted since the early years of the twentieth century on the kinetic characterization of the artistic object. The innovations introduced by personalities such as Duchamp and Moholy-Nagy legitimized the observer as a key element of the artistic experience. Their research led to a real dynamism which in turn generated the birth of new concepts such as the simultaneous development of space and time during the functioning of a work of art and the vital role of light.

Arte Programmata took all these formal inspirations and art experimentations to combine them with concepts such as programming and chance. The evolution accomplished by these young artists lies precisely in the idea of predetermining movements and interactions as well as programming cyclical sequences to generate 'fields of events'[438] where the random element and the free choice of the observer contribute to make the *open* artwork.

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[437] It is however interesting to underscore a certain interest in Manzoni for the mechanical and not just the gestural aspect of the work of art which is demonstrated for example in the choice to include in the first issue of the Azimuth magazine the graphic trace deriving from the functioning of one of the Tinguley's *Meta-matic* machines that, when set in motion, created random graphic signs and drawings on sheets of paper. See *Azimuth*, 1 (1960). To inspire the artists of this period on the role of the machine and, more in general, on the mechanical element in the artistic production, it is possible that the famous exhibition *Vitalità nell'arte*, which was held in Venice in 1959, particularly influenced the artistic community. During the event the theme 'Dipingere con le macchine' was addressed with a lecture/poetry by the painter Asger Jorn. See Luca Massimo Barbero, 'Azimut/h continuità e nuovo', in *Azimut/h continuità e nuovo*, pp. 19-41 (p. 36).
[438] *Arte cinetica. Arte programmata. Opere moltiplicate. Opera aperta*, exhibition catalogue.

Chapter 4: Arte Programmata: a Definition of 'Programming'

The purpose of this chapter is to frame the concept of programming from a theoretical, philosophical, and modal viewpoint as well as to describe its role in the Arte Programmata movement, subsequently underlining its peculiarity acquired by giving programming a distinctive function. Furthermore, this part intends to introduce the concept of chance that represents the other key element – along with the idea of programming and strictly related to it – for a definitive understanding of this movement, especially in relation to the observer. Meneguzzo describes in his text *Arte Programmata cinquant'anni dopo* the uniqueness of the Italian trend as a movement that has turned 'la vocazione ludico-cinetico-sperimentale degli artisti più giovani […] verso una concettualizzazione di tipo scientifico, verso un'attenzione più marcata alla percezione'.[439] This 'ludic vocation' can be linked to the element of chance that, along with programming, identifies the Italian kinetic trend as an harmonic artistic expression where the jarring dichotomy between rationality and emotion, programming and chance, as well as science and art, can coexist.[440]

The activity and concept of programming implies the presence of a free and informal counterpart that is not so relevant in other similar kinetic experimentations such as the G.R.A.V. group. As testified by Meneguzzo, the French group never included the idea of chance in its works (see Chapter 2, section 2.2.2), limiting the research to an 'exact art' that is focused on physiological perception.[441] The difference with the Italian artists becomes evident in the analysis of the aforementioned Gruppo T's programmatic text of 1959, where there is a vivid reference to the importance of dynamism that is not present in the G.R.A.V. programmatic texts. This is probably due to the absence of the influence of Eco's ideas which instead characterized the Italian Arte

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[439] Marco Meneguzzo, *Arte Programmata cinquant'anni dopo*, e-book (location, 401-402).

[440] Bruno Munari in 1983 in the *Dichiarazione di principio e di metodo (sul lavoro dell'artista)* well summarised the idea of all these different features with the metaphoric image of a ride characterized by programmed elements and casual occurrences: 'Una giostra è un oggetto di arte cinetica e programmata. Cinetica perché si muove, gira, ma ad ogni giro si ripete e questa è una costante. Le varianti sono le persone che salgono e scendono ad ogni giro e cambiano la composizione dell'insieme. La programmazione consiste nel disporre degli spazi nell'oggetto, dove la gente, sempre diversa, si può disporre a caso e quindi modificare anche l'aspetto cinetico, dato che la gente non sta ferma ma si muove a sua volta'. See *Arte programmata e cinetica (1953-1963). L'ultima avanguardia*, ed. by Lea Vergine, p. 176.

[441] In the G.R.A.V. proposal brochure of 1961 the French artists stressed on the concept of a production that is more a visual experience than an artistic one: 'Nous aimerions retirer de notre vocabulaire le mot art en tant qu'expérience strictement visuelle située sur le plan d'une perception physiologique et non émotive'. See *Stratégies de participation – 1960-1968: Groupe de Recherche d'Art Visuel (GRAV)*, ed. by Yves Aupetitallot, p. 66. On the concept of G.R.A.V.'s production as an 'exact art' see Marco Meneguzzo, *Arte Programmata cinquant'anni dopo*, e-book (location, 831-834): 'Gli artisti del GRAV vengono quasi tutti dalle esperienze di Victor Vasarely e da quell'idea di "arte esatta" che non poteva comprendere nessuna deviazione dalla "linea". Semmai, è alla fine della loro esperienza, dopo gli anni settanta, che singoli artisti che avevano fatto parte del gruppo si lasciano andare a ricerche più libere, più "giocose"'.

Programmata programme at a national level. In his essay *Opera aperta*, Eco introduces a fundamental concept that underlies the idea of chance and dynamism in the Arte Programmata production, namely the concept of 'entropy'. Borrowed from the theory of Thermodynamics to be applied to Information Theory, entropy determines the consumption of information. While information is the representation of the idea of order, entropy is the measure of disorder. In fact, as Eco points out in his text, information theory considers information as a series of systems organized according to probabilistic laws – the order of a message determines its predictability – into which an external source of disturbance can enter, thus importing a share of disorder and therefore of entropy.

Dynamism represents a direct contact with the surrounding reality and a suitable metaphor for it,[442] as well as the most effective artistic expression to render the effects of programming and the potential randomness in front of the observer. This chapter will demonstrate how these opposite features produce art experiences that can be defined as didactic and ludic at the same time, reinforcing the concept already introduced of edutainment.

The second part of this chapter introduces an innovative interdisciplinary lens through which it is possible to interpret the concept of programming. This approach will include aesthetics and semiotics, revealing that programming can hold a new fundamental communicative role in promoting a rational concept of art that has its roots in the theories of Moles and Bense. At the end of this reflection, it will be clear how the work of art can be interpreted as an ensemble of aesthetic information that must be communicated to the observer in a clear and rationally explicable way. To perform this analysis, it will be fundamental to make a comparison between programming and the Bensian notion of 'correality' to better contextualize and exemplify the aesthetic function of programming as a mode.[443] The comparison of the programming activity with the theory of 'correality' will help to better define the various steps of programming as well as the relationship

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[442] The dynamism and then the movement are essential for programmed artists. Anceschi, when he was interviewed by Meneguzzo in 1995 claimed the necessity of movement in artworks in order to define an artist as 'programmed': 'Chi non usava il movimento non era programmato. Castellani non lo voleva usare e non era un programmato-cinetico. Il programma per noi era il pilotaggio dell'effetto […]'. See *Programmare l'arte: Olivetti e le neoavanguardie cinetiche*, p.125.

[443] As already cited above, albeit Bense never got directly cited by programmed artists in their texts, his ideas and theories reached these young artists – particularly referring to Gruppo T – through the figure of Munari, who defined himself as the father of Arte Programmata. The Milanese artist was in fact a great friend of Bill, who was in turn a keen admirer of the German philosopher. Bense's theories took part in a common research approach that brought together artists and intellectuals who were trying to achieve a new definition of art. This new notion should have renovated art as a universal concept devoid of cultural barriers that promoted a novel idea of beauty as a rational and analysable feature. The 1966 volume of *il Verri* – which was dedicated to Arte Programmata and will be dissected later in this chapter – featured two different articles written by Bense with some speeches and technical notes from Gruppo T. Thus, the methodological approach chosen in this thesis to use the definition of 'correality' to explain and justify the role of programming from a theoretical viewpoint finds its basis on the common ideologies and purposes that characterises both Bense and programmed artists, albeit there has never been a direct dialogue between them. See *Arte Ri-Programmata: Un manifesto aperto*, ed. by Serena Cangiano, Davide Fornari, Azalea Seratoni, p. 74; see section 3.1 for the relationship between Bill and Bense; see note 128 for the diffusion in artistic circles of Moles' writings and theories.

between the artist and the artwork and between the artwork and the observer which inevitably finds him/herself interacting with the work of art precisely because of the programming activity.

4.1 The Relationship Between Programming and Chance in Arte Programmata

Since Gruppo T, Gruppo N, and Mari distinguished themselves from other kinetic groups in Europe by the peculiar interpretation given to the role of programming in their works, the critical examination of this distinctiveness is fundamental to complete the characterization and definition of this movement. To better define and comprehend the concept of programming amongst the artists of Gruppo T and Gruppo N in the 1960s, it is helpful to turn to critic and curator Meneguzzo, who wrote that 'L'idea di programmare l'arte non solo era allora nuovissima e intelligentemente provocatoria, ma regge in modo egregio anche oggi'.[444] The word programming was certainly on everyone's lips from the end of the 1950s and into the following decade; Varisco herself, in an interview with Meneguzzo in 1995, explains it very well: 'L'idea di programmazione era mitizzata dal contesto sociale e dal boom economico: ovunque si parlava di programmazione. Mi sembrava di vivere un momento in cui pareva davvero di poter programmare la vita'.[445] From the middle of the 1950s the Olivetti company began to take an interest in technological innovation for its production and started to work on the first electronic calculators. During the same decade the chip and the transistor, essential parts for the functioning of the electronic computer, were invented and perfected: the role of the computer programmer acquired more and more value.

The idea of programme and programming, in a broader sense, permeated the entire society of the period. In the first household appliances of the period, such as, for example, semi-automatic washing machines, the middle class learned that a selected program was the language with which the user was communicating with the machine to obtain a specific washing solution. Television programming is another good example that allows us to understand the spirit of the period: different programmes, at different times, created in the average user the need to plan a choice and to select, by manipulating the buttons of the electronic device, the preferred programme or show. Even though Gruppo T's and Gruppo N's conception of programming is not closely related to the computer discoveries that were multiplying in those years, it presents some similarities with this specific field. To be more precise, the idea of predetermining and forecasting the observer's movements and

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[444] Ibid., p. 23.
[445] Ibid., p. 138.

interactions with the artworks as well as the study of the cyclical movements of these machines may resonate with the digital-oriented idea of programming, that is entering commands in the form of a specific language that the computer machine executes. In both cases the artist and the programmer set the conditions for the development of a change: for the artists the planning of real or illusory kinetic variations of the artworks could produce psychological, visual, haptic or motor reactions in the observer, while for computer programmers the use of a programming language generates a cascade of subsequent functions that operate together to fulfil a predetermined complex purpose for the user of the program. Programming, then, can be defined as the first step or the trigger of a subsequent change that inevitably implies the observer's participation.

A useful and recapitulatory definition of programming as an alternation of operating models and chance, both for artworks characterized by real or illusory movement, is given by Crispolti:

> La 'programmazione' è nell'apertura controllabile, nella varietà fruitiva prevista in un ampio arco in cui giocano i coefficienti di programma diretto e di caso (programmazione indiretta, direi); e cioè si registra tanto nella fruizione dinamica dell'opera in struttura non mobile, che, naturalmente a maggior ragione, nella soluzione cinetica, realizzata attraverso un meccanismo elettronico.[446]

Examining critics' and artists' sources, the first term that could be used to define the role of programming for Gruppo T and Gruppo N is *combination*: Munari clearly used it in the text published in the 'Arte Programmata. Kinetic Art' exhibition brochure, printed in 1964, for the American tour of the exhibition sponsored by the Olivetti Company (fig. 80).[447] Munari states that programming can be explained as an organized and precise planning of variations in visual stimuli (caused by the movements of the artwork itself or by the optical effects derived from real kinetics or actual optical effects) and tactile ones (derived from the designed interactions – sometimes unavoidable – between the observer and the machine), which are all connected to each other. The term *combination* identifies a whole set of different elements as well as a regular and rational inner organization that embodies an Arte Programmata artwork: with this word Munari clearly establishes how programming can also be described as a *structure* or a *model* where different series of combined aesthetic situations and observer's interactions can be planned to be applied sequentially in a fixed way. The term *structure* or *model* recalls the analysis conducted by Eco on the concept of *open work* where he theorizes the fact that the term *open* identifies a structure that is not a simple link between the physical components

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[446] See Enrico Crispolti, 'Neoconcretismo, arta programmata, lavoro di gruppo', pp. 20-67 (p. 41).
[447] Bruno Munari, Riccardo Musatti, *Arte programmata. Kinetic Art*, exhibition brochure.

of an artwork, but which instead defines a relation of consumption (see Chapter 1, section 1.2).[448] This relationship acts at every level: both in defining the functioning of an object and in defining its relational power.

Given these premises it becomes clear how the real role of programming acts before the actual display of the works in galleries or museums, starting from the artists' studio where the functioning of these pieces of art was planned and forecasted in detail, including in this phase the subsequent onlooker's role. Programming, then, is present in the very making of the works of art:

> The programming of these works […] is to be understood in the sense that each artist chooses a particular material and the structural, kinetic and optical combinations that he considers most suitable for the embodiment of his artistic intuition. […] In these works of programmed art the fundamental elements, that along with the kinetic and optical combinations, will give life to a continuous series of images are either in a free state or are arranged objectively in geometrically ordered systems to create the greatest number of combinations, often unpredictable in their mutations, but all programmed in accordance with the system planned by the artist.[449]

What programming aims to create therefore are structured combinations of aesthetic situations that will take place when the work of art is experienced, generating in turn new aesthetic situations that were forecasted, but whose evolution cannot be planned to contribute to the enrichment of the observer's experience. Boriani from Gruppo T, in fact, in his speech about the problems of Arte Programmata held at the Istituto Nazionale di Architettura (I.N.ARCH.) of Rome in April 1965, specified that at the roots of programmed objects there are 'concetti strutturali', 'metodologie e criteri operativi'.[450] Boriani believed that the emphasis on the rational approach that is the basis of his artistic research is fundamental. These words emphasize yet again the role of programming as a framework that determines the variable and kinetic nature of the artwork. He defines kinetics as the 'evidenziazione dei processi operativi' of the artwork.[451] This sentence underscores, as previously expressed, how programmed artworks are a clear example of *works in becoming* – and for this reason *open works* – where a rational and pre-determined method of operation is the required foundation of a subsequent dynamic interaction between the observer and the machine.

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[448] Umberto Eco, *Opera aperta. Forma e indeterminazione nelle poetiche contemporanee*, p. 21.
[449] Bruno Munari, Riccardo Musatti, *Arte programmata. Kinetic Art*.
[450] *Ricerche a Milano agli inizi degli anni '60*, ed. by Gillo Dorfles (Milano: Studio Luca Palazzoli, 1970), p. 7.
[451] Ibid.

This ongoing relationship between the artwork and the observer, made of clear movements and predictable reactions, can be defined when the artwork is operating in front of the observer as 'programming in action' (or 'generative aesthetics', borrowing a definition from Bense). 'Per estetica generativa si intende […] la globalità delle operazioni, delle regole, dei teoremi che, applicati a un sistema di elementi materiali a funzione segnica, riescono a produrre questi stati estetici […] in modo cosciente e metodico'. This sentence well describes how the planned activity of programming, along with the materiality of the work of art, produces – when the artworks are operative – different aesthetic states that can be otherwise defined as programming in action. [452] This second step carries within itself another concept: the idea of chance, which breaks the rules of programming and changes the definition of Arte Programmata itself to a harmonic balance between method and chance.[453]

The idea of chance and volatility immediately recalls the concept of dynamism of the artistic object: in the article 'Attualità e utopia dell'arte programmata', published by the critic Menna in the magazine *Filmselezione* in 1963, Arte Programmata is 'un'arte […] che distrugge la forma e la ritrova nel movimento organico'.[454] Programming, therefore, plans the visual shape of the artwork, determines the characteristics immediately perceivable by the observer and regulates the kinetics. Thanks to programming, the artwork is no longer a static element, but becomes pure activity that is featured by the programmed movement and the onlooker's functioning interaction. It is necessary, then, to turn to Eco again: in *Opera aperta* he defines the *open* artwork as a 'direzione dell'arte contemporanea':[455] the role of programming is to set the conditions for a direct and open dialogue between the artwork and the observer, marking a new tendency in Contemporary Art characterized by a new rational approach to interact with the observer's engagement.

In a broader sense, it is possible to define programming from an interdisciplinary viewpoint as a project that, through the technical planning of formal, chromatic, and kinetic variations in a determined temporal order, establishes a semiotic communicative link with the observer. Eco clearly specifies this communicative feature when he describes the idea of structure of an *open work* as a 'rapporto fruitivo', identifying the importance of the communicative peculiarity of an *open work* as an ontological and essential element of the *open work* itself.[456] The same concept, but more strictly

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[452] See Max Bense, *Estetica*, p. 468.The programming complex system will be defined in the second part of this chapter.

[453] This idea of a balanced presence of rational and casual elements is summarized very effectively by Eco in an interview with Meneguzzo: he created a parallel between the artistic tendency of Informale – that claimed in the 1950's the refusal of any rational canon in a piece of art – and the rationality of programmed artworks through the element of chance and the unpredictability of the observer's interaction. 'Ho detto che c'era questa divaricazione tra l'Informale e l'Iperformale, ma cosa li univa? L'idea di opera cioè di molteplicità di interpretazione tra una cosa ferma e una in movimento'. See *Programmare l'arte: Olivetti e le neoavanguardie cinetiche*, ed. by Marco Meneguzzo, Enrico Morteo, Alberto Saibene, p. 55.

[454] Filiberto Menna, 'Attualità e utopia dell'arte programmata', *Filmselezione*, pp. 79-87, (p. 80).

[455] Umberto Eco, *Opera aperta. Forma e indeterminazione nelle poetiche contemporanee*, p. 19.

[456] See Chapter 1, section 1.2.

related to the case of Arte Programmata, is expressed by Menna in 'Attualità e utopia dell'arte programmata': 'L'arte programmata si caratterizza […] per il fatto cioè che essa non intende esaltare la macchina […] ma intende servirsene per "una necessità positiva di indagine e di comunicazione" '.[457]

The communicative feature of programming will be analysed from a modal point of view later in the chapter, but it is fundamental to highlight here another aspect of the communicative feature of programming: the purpose of the research, or what Menna called 'necessità d'indagine'.[458] The programming structure is the first step towards establishing a relationship between the artwork (but also the artist) and the observer; it sets the conditions for a direct dialogue between the piece of art and the public. This direct communication is dependent on the Gestalt research into the observer's perceptual process and his/her fruition of aesthetic messages. The interest of the artists in the observer's aesthetic communication arose from the investigation of the variable, multi-stimuli, and technological environment in which people lived at the time.[459] What is evident for them is that the observers need to adapt their perception to a new dynamism and the simultaneous presence of different stimuli. More importantly, they claimed that a static piece of art, given these contextual influences, could be anachronistic. The programming feature, therefore, acts not only as a project/method that could set the basis for an *open work*, or as a structure/framework for the subsequent observer's interaction, or even a means to communicate aesthetic information, but also as a metaphor for the surrounding modern environment.[460] To be more precise, the use of programming identifies a new perceptual and aesthetic approach that describes the external world through the lenses

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[457] Menna, 'Attualità e utopia dell'arte programmata', pp. 79-87 (p. 85).

[458] The research aim of Arte Programmata groups was underscored during the Convegno Internazionale artisti, critici, studiosi d'arte of Verucchio in 1963: it was considered the best approach for a balanced coexistence of rationality and freedom in contemporary art. The research attitude could then join together the subjectivity of the observer's attitude to knowledge with the importance of an organized method. 'La poetica che si è andata formando in questa situazione ha portato ad una trasformazione del concetto di fare artistico in condizioni di ricerca; in quanto è la soddisfazione nella quale libertà ed invenzione sono complementari di metodo ed organizzazione. La ricerca che compiamo sui mezzi e con i mezzi della comunicazione visiva, tende da un allargamento della conoscenza, (vuole indagare, individuare e insieme proporre nuovi ordinamenti)'. See 'Convegno internazionale artisti critici studiosi d'arte. Un momento assai vivace', *Marcatrè*, 1 (1963), 25-34 (pp. 29-30).

[459] The role of science and the technological context of everyday life, as already stated by Gruppo T in their programmatic text, seem to determine a new and inevitable approach to the work of art. The critic Apollonio agreed with this theory stating that: 'Del resto il mutato modo di percepire la realtà è confermato sul piano scientifico dalla 'Gestaltpsychologie'. Senza alcuna pretesa di fare della filosofia e nemmeno di adattarsi ad un determinismo positivista, si può con tutta tranquillità pensare che lo spirito che anima la ricerca scientifica e le conquiste cui essa perviene non possono non condizionare in qualche guisa la misurazione del mondo che ognuno opera e non allargare le possibilità di riferimento e relazione instaurabili tra oggetto ed oggetto, come tra soggetto ed oggetto.' See Umbro Apollonio, 'Ipotesi su nuove modalità creative', *Quadrum*, 14 (1963), 5-34 (p. 10).

[460] The industrial society is no longer an obstacle for the artists' creations, but a source for their experimentations. Technology is not only at the service of mass media, but it is necessary for an active observer's artistic experience. 'La funzione delle ricerche cinevisuali si chiarisce proprio a questo punto, nel momento cioè in cui esse non eludono lo scontro con la nuova realtà industriale e pubblicitaria fondata sull'immagine e sulla comunicazione visiva, ma si assumono il compito di fornire dei modelli di valore […]'. See Filiberto Menna, 'Situazione delle esperienze cinetiche e visuali in Italia', 104-114, (p.104).

of science and technology, highlighting the necessity for contemporary art to adapt itself to modern times.[461] Since the dynamic feature of modern times is provided by the increasing role of technology and science, programming, as a scientific approach itself, is the most suitable means to 'recreate' the new stimulating environment, helping the observer to 'train' his/her perceptual abilities. The artists' studios became scientific laboratories where they tried to study, recreate, and perform 'environmental stimuli' through operating models (fig. 81, 82, and 83). We see here an attempt by the art production to emulate the scientific attitude via the role of programming. This concept is well expressed by the critic Umbro Apollonio, one of the most enthusiastic evaluators of Arte Programmata:[462]

> Quindi si aspettano opere che entrino nella sfera sociale vivente, non ne siano separate […] Il problema è null'altro che nell'ambientazione estetica della nostra vita, così che non ci sia più divario tra immagine ed esistenza, ma i due termini coincidano con tale aderenza da poter essere largamente accolti e condivisi. […] Si vuole immaginare un'arte che delimiti un campo nel quale le virtù creative forzano tutte le disponibilità del mondo ad un fine di ordine estetico, integrato nell'organismo del tempo umano.[463]

This concept of art as an element that is perfectly integrated into real life is linked to the idea that programming can be described as the means by which the observer, being actively engaged, starts to develop a new self-awareness, transforming him/herself from a passive onlooker into an active 'technician', a person able to understand from a programmed experience and from the functioning of an object a lesson of 'pedagogia della visione' becoming an expert in turn.[464] Through the activation of the sequences programmed by the artist, the observer becomes aware of the purpose and the functioning of a specific work of art and its didactic message:

> […] Spettatore, che passando dalla visione alla concezione dell'oggetto, concezione della sua meccanica strutturale, passerà a una comprensione logica da una solo sensitiva,

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[461] Eco is aware that these new artistic experiences are shaped by the science influence: science is the lens through which read the 1960s context. Artistic expression is nothing more than another way to interpret and communicate a scientific attitude: 'Con questo tali esperimenti si allineano a molti altri e, attraverso tutti l'arte contemporanea adempie una delle sue funzioni principali, col provvedere cioè all'uomo d'oggi traduzioni immaginative della realtà naturale che la scienza gli definisce'. See Umberto Eco, 'La forma del disordine', *Almanacco Letterario Bompiani 1962*, pp. 175-188 (p. 176).

[462] Crispolti well outlines the role of Apollonio and his critical positions regarding Arte Programmata and its positioning in the technological society of the time. '[…] Apollonio – che fra i critici italiani è quello che forse ha, sia pure improvvisamente, con maggiore decisione preso le parti dell' "arte programmata" – spinge alle conseguenze logiche […] il problema di un'arte intimamente adeguata ad una civiltà industriale: un'arte che si serva della macchina, come tramite dall'individuo alla collettività'. See Crispolti, 'Neoconcretismo, arta programmata, lavoro di gruppo', pp. 20-67 (p. 51).

[463] Umbro Apollonio, 'Ipotesi su nuove modalità creative', 5-34 (p. 7).

[464] Filiberto Menna, 'Situazione delle esperienze cinetiche e visuali in Italia', 104-114 (p. 107).

trasformandosi da spettatore in tecnico e la trasformazione, più larga possibile, di un pubblico di spettatori in un pubblico di tecnici è una delle mete a cui il nostro lavoro aspira.[465]

The idea of the observer as a 'technician' is equivalent to the concept of 'cultural operator' theorized by Eco (Chapter 1, section1.2): the influence of the scientific field is evident even in the use of the terminology. The critic Menna and the artist Colombo seem to agree on the didactic potentialities of programmed experiences, stressing the presence of a scientific, aesthetic and pedagogical purpose in a programmed experience: Menna, in fact, stated: 'Le ricerche visuali si concretizzano in strutture fondate su premesse di ordine sperimentale ma nello stesso tempo tendenti a una finalità estetica e a una pedagogia della visione'.[466] We witness here the identification at the highest level of Arte Programmata as a form of *open work*. Following Eco's theory, programming exemplifies the consumption relationship between the people of the 1960s and their context, it allows the work of art to be dynamic, and, lastly, it introduces the onlooker's active and aware interaction. Furthermore, focusing more on the role of the observer, it is possible to consider his/her planned change of awareness caused by the artistic experience as a form of movement and dynamism itself, highlighting even more the open essence of this kind of artistic production.

Based on Colombo's words, the artists' attitude of researching and analysing through programming activity leads inevitably to the delineation of another feature: the didactic purpose. This idea is well expressed by Eco himself in the programmatic text published in 1962 for Gruppo T and Gruppo N's first exhibition in Milan at the Olivetti store:

Nell'ambito della civiltà occidentale del XX secolo si è andata affermando una pratica formativa capace di porre capo ad oggetti mobili – secondo una dialettica di programmazione e casualità – che il pubblico o parte del pubblico 'consumava' abitualmente come arte, usandoli come stimolo concreto per considerazioni di ordine formale, compiacimenti immaginativi e – spesso – riflessioni di ordine conoscitivo.[467]

The didactic purpose ('riflessioni di ordine conoscitivo') of visual and kinetic alterations – caused by programming and its consequent enactment – can be explained in two different ways: it can be interpreted as an interest in the observer's perceptual answer, but also as a drive to promote the observer's self-awareness about human perception.[468] Here it is possible to read Colombo's definition

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[465] Gianni Colombo, 'Sulle ricerche plastiche cinevisuali 1964/65', *il Verri*, 22 (1966), 127-131, (p. 128).
[466] Filiberto Menna, 'Situazione delle esperienze cinetiche e visuali in Italia', 104-114 (p. 107).
[467] *Arte cinetica. Arte programmata. Opere moltiplicate. Opera aperta*, exhibition catalogue.
[468] Menna, citing the Hungarian art theorist Gyorgy Kepes, is quite clear about the different areas of interest where kinetic research could act in order to develop its didactic feature: a more complete knowledge about vision functioning; new

of the onlookers as new 'technicians' from an educative viewpoint: the observers, thanks to the *training* offered by the programmed experience, become aware of their own perceptual nature, improving and honing their abilities or, at the very least, being introduced to the importance of a 'method' in the study of images and plastic forms.[469] Therefore, artists can be considered as researchers who use programming as a means to learn from the observer's operative relationship with the environment. Colombo is the most compelling kinetic artist with this purpose, referring on more than one occasion to the possibility of defining his works as a sort of test for the observer. Describing one of his more famous works, *Strutturazione pulsante* (fig. 84; see also Chapter 3, section 3.3), the artist stated that:

> Con questa esperienza mi sono proposto di realizzare un oggetto visuale che […] si ponesse come una comunicazione visiva, prevalentemente ottica, dove lo spettatore si trovasse a contatto con una strutturazione controllata in ogni sua componente spaziale e in ogni sua fase cinetica. In modo tale che questo controllo – reso possibile dalla specifica base sistematica – si costituisse come una specie di 'regola del gioco' completamente leggibile ed evidente all'osservatore […]. Ho deciso che l'oggetto si ponesse in rapporto con lo spettatore alla maniera di un 'test' […] Più particolarmente intendevo che l'interesse ottico dell'osservatore nei riguardi dei valori della ripartizione spaziale e nei tempi dei movimenti fosse equivalente e si omogeneizzasse nella percezione di una organizzazione ritmica.[470]

Hence Colombo inferred that the programming of a work of art and its subsequent practical application can be defined as a dialogue, a flow of information, an exchange. In the text the artist

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visual tools to self-educate our perceptual capabilities; new sectors for the application of these scientific results: 'Le nuove tendenze pongono una serie complessa di problemi che possono essere riassunti, secondo le indicazioni di Gyorgy Kepes, in tre direttrici fondamentali: rendere innanzitutto più sistematiche le nostre conoscenze intorno al ruolo della visione; cercare gli strumenti idonei a sviluppare e ad educare la nostra percezione visive e, infine, individuare i settori in cui è possibile applicare e verificare i risultati ottenuti sperimentalmente'. See Filiberto Menna, 'Situazione delle esperienze cinetiche e visuali in Italia', 104-114 (p. 107).

[469] The programming phase activated in the course of the artistic experience was seen as a valid exercise for personal improvement: 'Gli artisti dell'arte programmata immaginavano l'arte come una palestra dei sensi, un addestramento necessario per sopravvivere in un mondo sovrastimolato da immagini pubblicitarie e tecnologie sempre più invasive'. See Massimiliano Gioni, 'Civiltà delle macchine', *Domus*, 957 (2012), 118-125, (p.119).

[470] *Ricerche a Milano agli inizi degli anni '60*, ed. by Gillo Dorfles, p. 9. The didactic role of Colombo's artworks is clarified by himself in the interview with De Sanna where he stated that his works have the aim to represent human perception itself. Works of art have, then, a double nature: the observers could, at the same time, learn from them, but also become aware of their role in the artistic experience: 'Io ho sempre sostenuto che i miei lavori avevano una caratteristica di autotest: non erano fatti per ricavare dei dati, ma per emancipare lo spettatore dal suo stato di percezione, rendendolo cosciente di quello che lo riguardava, che è una condizione della sua esistenza. Quindi le mie opere corrispondevano a una rappresentazione che mette in scena la percezione stessa […]'. See Jole De Sanna, 'Storia come filtro della qualità: Intervista a Gianni Colombo', in *I Colombo: Joe Colombo (1930-1971), Gianni Colombo (1937-1993)*, p. 29.

used the already mentioned term *strutturazione* to identify the starting optical and kinetic situation with which the observer must relate. Through the programming of the work in his/her studio and its subsequent application, the artist determines the rules for the perceptual experience that the observer will perform. Most importantly, the didactic feature is highlighted by the word 'test': this term identifies the artist's aim to analyse the onlooker's interaction with the machine for the study of the effects of predetermined aesthetic stimuli on his/her perceptive functions. Furthermore, this 'test' is indispensable to generate in the observer a wider knowledge and a clear awareness of his/her senses. Concerning for example the aforementioned artwork *Strutturazione pulsante*, the artist aimed to 'test' the observer's visual connections by programming the movement of a monochrome wall composed of identical tiles with unpredictable electromechanical impulses. From this unpredictability derives 'una situazione ritmica polivisiva' that makes it impossible for the observer to read the piece of art univocally while being concurrently stimulated from different areas of the white board.[471] Basing this research on the observer's viewpoint the meaning of the expression 'aesthetic operator', used by Eco and programmed artists to define those who work with visual and haptic experimentations and kinetic stimuli, acquires a new value. It is, then, not only a verbalisation that stresses the anonymity and the social role of the artist, but it acquires a technological value. As a computer operator guides, through a programming code, a machine designed for the solving of calculations and tasks, in the same way the 'aesthetic operator' drives, through pre-determined visual and kinetic interactions, the onlooker's perceptual experience.

The rational concept of aesthetics promoted by Moles and his idea of an artistic production influenced by other disciplines such as philosophy, psychology, physiology and semiotics leads inevitably to the comparison between the artists' wide approach to the programming activity and the cyberneticist's hybrid endeavour.[472] This great attention to the empowerment of the observers and their perceptual functions is linked to cybernetic research, especially the study lead by Ceccato on the 'machine which observes and describes'.[473] Colombo, in the 1966 edition of *il Verri* magazine,

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[471] *Ricerche a Milano agli inizi degli anni '60*, ed. by Gillo Dorfles, p. 9.

[472] Artists Boriani and Colombo identify in cybernetics and Arte Programmata the same curiosity and the same approach to study effectively the perceptual ability of human beings. 'Lo sviluppo logico di questa attività è quello di affiancarsi sempre maggiormente a quelle discipline che già indagano e contribuiscono ad allargare la regolamentazione nel campo dell'immagine'. See Gianni Colombo, 'Sulle ricerche plastiche cinevisuali 1964/65', pp. 127-131 (p. 130); 'Molte discipline, anche non tradizionalmente proprie alla categoria 'arte', possono aiutarci ad impostare razionalmente questo problema, che abbiamo finora affrontato con mezzi per lo più intuitivi. Esse possono fornirci una base di conoscenze oggettive e di criteri logici, necessaria per operare con esattezza ed efficacia. La teoria dell'informazione, la cibernetica, la Gestal-theorie, la psicologia sperimentale, la semiotica, l'estetica sperimentale, ed anche la matematica, la combinatorica, le geometrie, la tecnologia e le tecniche industriali, possono costituire un vasto repertorio di possibilità operative e di regole indicative'. See Davide Boriani, 'Programmazione nell'opera cinetica 1965', *il Verri*, 22 (1966), 136-137, (p.136). Text sent for the exhibition 'Direction in Kinetic sculpture' that took place at the University Art Museum of California University, Berkeley, between March and May 1966.

[473] For a wider analysis of Ceccato see Chapter 1, section 1.5. The stress placed by cybernetics on the importance of working with models and structures for the reproduction of the human mind is interesting in this place. Operative models

defined Arte Programmata as 'una emittente di stimoli coordinati capaci di ottenere dall'osservatore che ne fa esperienza un responso estetico'.[474] The term 'emittente' in this case can be compared to the tools used by scientists to study human activities, while the words 'responso estetico' transmit the idea of a series of aesthetic situations, derived from the kinetics of the artistic object, where the onlooker is engaged and that are functional for the comprehension of his/her perceptual functioning system.

From this investigation we can deduce that great attention was paid to the role of the human being and his/her relationship with the work of art: the focus of Arte Programmata as well as of cybernetics is, then, to reflect deeply on the human being and his/her functioning. In the first case art, through programming, adapts itself to the aesthetic needs required by the modern onlooker, also offering a *training* by means of the art experience to let the observer aware of his/her perceptual capabilities. Cybernetics, instead, offers research models and tools to analyse, through the influence of various disciplines and technological methods – especially Ceccato's work on vision –, the observer's aesthetic approach in the consumption of the work of art.[475] Programming and cybernetics, as research activities, have a solid interdisciplinary nature which is necessary to focus on the complexity of the human being.[476] In cybernetics the operative functioning of the human mind is highlighted and put in relation with the machine functioning in order to be better comprehended: the analysis of Arte programmata production emphasizes this concept again thanks to the contribution of programming, whose aim is to put the human being at the centre of its research.

The dynamic feature of Arte Programmata is present in the physical and virtual movement of the artwork, but also in the onlooker's approach to the work for its modification, and in the deriving observer's physical dynamism in relation with the piece of art. However, dynamism in a programmed artwork is predominantly expressed in the fluid and continuous alternation of programming and chance. Chance represents the third phase of the programmed experience after the programming

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are the basis of Arte Programmata too: both disciplines have the purpose of recreating the human perceptual system: 'Il problema del cibernetico è di costruire una macchina capace di operazioni mentali, una macchina che sia in un certo modo un modello della mente umana, naturalmente in una ridottissima scala di valori. I molti discorsi della filosofia e della psicanalisi servono poco o niente al cibernetico: egli ha bisogno, per riprodurli in organi meccanici, di elementi precisi, di elementi riducibili in operazioni e in gruppi di operazioni'. See Gianni Roghi, 'La matita e la mente', *L'Europeo*, 30 (1964), 60-65 (pp. 62-64).

[474] See Gianni Colombo, 'Sulle ricerche plastiche cinevisuali 1964/65', pp. 127-131 (p. 128).

[475] Ceccato's interest focused on a machine that could replicate every stage of the human aesthetic approach, from the fruition of a work of art to the active interaction with it. 'Chi vuole costruire una macchina a nostra immagine e somiglianza deve prima sapere come siamo fatti noi, o meglio, poiché la macchina non è un monumento, deve prima sapere come funzioniamo noi. E chi intende costruire una macchina che si comporti come noi quando ci atteggiamo esteticamente? Magari nel momento non solo fruitivo dell'opera, ma anche creativo od interpretativo-esecutivo?'. See Silvio Ceccato, 'Proposte per una indagine estetica da parte di un cibernetico', *La Biennale di Venezia*, 61 (1967), 24-31 (p. 24).

[476] As for science, Arte Programmata uses an analytical approach for its experimentations: 'L'Arte Programmata, cinetica, visuale, tenta non solo il recupero, ma l'inglobamento dei metodi scientifici e tecnici nell'ambito del suo operare stesso, di assumerne i mezzi a fine estetico'. See Laura Vinca Masina, 'Arte Programmata', *Domus*, 422 (1965), 40-46, (p.46).

activity in the artist's studio and the so called 'programming in action', and directly derives from it. Eco perfectly described this inner dynamism of Arte Programmata between a rational and a random phase as a combination of two opposite realities that are perfectly integrated. He introduces at a theoretical level the role of chance in Arte Programmata in two different moments. First, he defines it in the *Almanacco Letterario Bompiani* of 1962, specifying where this characteristic comes from and its relationship with science, the undisputed dominator of the Arte Programmata object:

> La scienza scopre il Caso? L'arte si butta a corpo morto sul Caso, e lo fa suo. […] Il principio è rigorosissimo, il punto di partenza ha la immobilità perfetta delle forme classiche che facevano impazzire di vertigine matematica i teorici della Divina Proporzione. […] Ordine e geometria, ecco il punto di partenza. Il punto d'arrivo invece non dipende più dal programmatore, ma appartiene a quella zona di libertà in cui si muove il mondo subatomico, quello della equiprobabilità statistica.[477]

Chance in the artistic experience derives directly from the rigour of programming, from the predetermined structure of aesthetic variations carefully planned and then implemented by the artist. Chance is an element that, paradoxically, is expected in the evolution of the art object: it arises from the plans to modify the rules of the experience proposed by the artist and to alter the balance of the art relationship in favour of the observer. The relationship between chance and programming follows the same dynamics between order and chaos that exist in nature: they are intimately intertwined. Subsequently, Eco clarifies even better the idea and the role of chance in the programmatic text for the first exhibition of groups T and N at the Olivetti store in Milan. Starting from the idea of programming as a basic structure for a subsequent dialogue with the observer, it is therefore possible to consider the random element as a moment in which the observer is left freer because the interaction with the work is indeed programmed, but some consequences of this planning are deliberately left to chance. These situations that can be created in the course of the art experience are defined by Eco as 'fields of events' [campi di accadimenti] and represent the link between the planned element and the unplanned one that coexist in Arte Programmata:

> Ma un oggetto che si muove, o si muove in base ad alcuni schemi fissi previsti da un motore […] o si muove sollecitato da forze naturali, […] o vagamente presumibili in rapporto alle possibilità dinamiche dell'oggetto in quanto struttura sottomessa a determinate leggi fisiche. Anche qui di nuovo la vecchia dicotomia: o la regola matematica, o il caso. Ma è proprio

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[477] Umberto Eco, 'La forma del disordine', *Almanacco Letterario Bompiani 1962*, pp. 175-188 (p. 175).

vero che la regola matematica e il caso si escludono? In effetti si danno in natura fenomeni che avvengono a caso e di cui tuttavia è prevedibile il decorso in base a regole statistiche […]. Non sarà dunque impossibile programmare, con la lineare purezza di un programma matematico, "campi di accadimenti" nei quali possano verificarsi dei processi casuali. Avremo così una singolare dialettica tra caso e programma, tra matematica e azzardo, tra concezione pianificata e libera accettazione di quel che avverrà […].[478]

The element of chance can be described as a real value of openness of the work of art: it is the feature in charge of the unpredictable execution of an artwork that starts from planned and programmed operating models. Random changes in the artwork, as already explained, are either produced directly by the observer who physically interacts with the machine or caused by an independent electromechanical program. For example, in Colombo's *Strutturazione pulsante* or *Strutturazione fluida*, the random sequences of the protrusions in the first case and the continuous sliding of the belt causing always different curves in the second case are examples of chance features developed from a planned organization of the kinetics of the objects. However, considering some works created by Gruppo N, such as *Visione dinamica* by Toni Costa, programming acts in the planning and creation of a virtual and apparent kinetics, setting the conditions for the observer's movements and interpretations in front of it. The movement of the onlooker in front of the work determines the virtual dynamism of the artwork itself.[479]

The randomness of programmed works is linked with the observer's reactions in front of the work and produces a 'serie di accadimenti che si fanno mentre si osserva' and that make the artwork open and dynamic.[480] More generally, the openness of a programmed artwork is not just explained by the occurrence of kinetics (from the artwork or from the observer), but, most of all, by the fact that every programmed piece is always perceived as different by the observer at the end of each programming sequence. Programming, then, sets the premise for the unpredictable alteration of the work.

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[478] *Arte cinetica. Arte programmata. Opere moltiplicate. Opera aperta*, exhibition catalogue. The unpredictability is one of the key features of an *open work*. Eco seems to describe it as a positive element, adding that, due to the subjectivity of the experience, the *open work* has endless meanings and is always new. It is interesting how he compares the countless lives and interpretations of an *open work* to modern scientific disciplines that, as for a programmed artwork, are characterized by clear, but also imprecise features. This could refer to the development in these years of the studies of space and subatomic physics: in both cases the 'unknown' and 'randomness' coexist with the rational structures of the celestial bodies and atoms. 'Per cui non sarà azzardato ritrovare nella poetica dell'opera 'aperta' (e più ancora dell'*opera in movimento*), dell'opera che ad ogni fruizione non risulta mai uguale a se stessa, le risonanze vaghe o precise di alcune tendenze della scienza contemporanea'. See Umberto Eco, *Opera aperta. Forma e indeterminazione nelle poetiche contemporanee*, p. 51.

[479] See Chapter 2, section 2.2.2: *The Responsive Eye* exhibition catalogue describes this kind of programmed involvement that derives from virtual movement as 'the incorporation of spectator movement'. In this way the observer adds a kinetic feature to the artistic experience.

[480] *Ricerche a Milano agli inizi degli anni '60*, ed. by Gillo Dorfles, p. 8.

In a programmed artwork the element of chance can be identified on two different levels: the first is related to the consequences of programming in action and implies the physical and virtual changes of the artwork, while the second concerns primarily the observer's role. A clear example of this first level of chance can be found in *Rilievo ottico-dinamico* by Gruppo N (see Chapter 3, section 3.3). The programmed plan of the artwork can be identified in the design of the rods and in their flexibility, which set the conditions for a programmed interaction with the onlooker. Instead, the random feature of the work is determined by the observer's active participation in modifying the structure of the panel: each observer can interpret the artwork differently by moving the rods in various ways (fig. 85). This random alteration determines a continuous re-shaping of the artwork that can, then, be defined as visually and ontologically unstable. Another clear example of the alternation of programming and chance that results in an unpredicted variation of the work of art at the end of each programming sequence is *Bispazio instabile* created by Ennio Chiggio from Gruppo N (fig. 86). This artwork consists of a wooden box with glass sides that contains two spaces connected to each other and filled with red and white spheres, which can migrate from one side to the other via three small holes. While monochromatic at the beginning, as the spheres begin to move from one side to the other with increasing manipulation by the observers, the two sides create ever-changing random configurations.[481] Here again the well-defined physical characteristics of the artwork as well as the intentional and planned alteration by the onlooker cause random effects and modifications that take place while the work of art operates. Furthermore this artwork, due to the extremely high number of possible combinations, represents a striking example of statistic calculus: among all the possibilities, there is in fact the one in which all the balls would distribute exactly as at the beginning, in perfect chromatic equilibrium. This object can also relate to the way gas particles were represented in physics laboratories, especially to the kinetic theory of gases.[482] The use of coloured balls is very frequent in these years of great scientific ferment also for the realization of models for the representation of molecules, atoms and for the structure of DNA (fig. 87 and 88).

The second level of the influence of chance mainly involves the observer directly: the dynamism of the machine as well as the 'letture molteplici'[483] offered to the onlooker renew and expand his/her aesthetic experience. The perceptive ambiguity derived from these experiments makes it impossible to orient the onlooker towards a defined interpretative solution of interpretation. This

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[481] 'Una quantità di piccole sfere bianche e rosse sono costrette in due spazi comunicanti delimitati da tre cristalli quadrati. Il cristallo centrale ha un foro circolare che permette il passaggio di una sfera alla volta. Spostando l'oggetto, la quantità delle sfere nei due spazi sarà sempre diversa e i due colori comporranno figure sempre diverse'. See *Arte cinetica. Arte programmata. Opere moltiplicate. Opera aperta*, exhibition catalogue.

[482] See *Programmare l'arte: Olivetti e le neoavanguardie cinetiche*, ed. by Marco Meneguzzo, Enrico Morteo, Alberto Saibene, p. 65.

[483] *Ricerche a Milano agli inizi degli anni '60*, ed. by Gillo Dorfles, p. 7.

premise offers the observers the possibility to *conclude* the experience by adding themselves their personal contribution to it. The final meaning of the artwork is thus provided by the onlooker who, thanks to his/her personal way of interacting with the work, moving around it, and reacting in front of it, attributes a different value to it at the end of each kinetic permutation. A clear example of perceptive permutations is offered by some of Varisco's works from Gruppo T. In *9 x 9 x X Spazi in variazione* she crafted a squared space where blue light is diffused through a sloped, striped pane of glass. A matte screen of rotating horizontal and vertical lines filters the light together with the glass, playing on the reflection of the light and its close relationship with the shadows that the screen creates (fig. 89 and 90).[484] From a functioning viewpoint, the work of art can be compared to *Strutturazione pulsante* by Colombo. If in Colombo's work programming always gives life to new combinations of expanding tiles, here continuously different relationships between light and shadow are generated in the work. Programming thus provides the basis for the implementation of always different aesthetic combinations that correspond to the aleatory element. However, here we want to emphasize above all another element of randomness of the artistic experience that is the participation of the observer in the continuous flow of aesthetic situations. Although the variations are decided as much as possible by the artist during the construction of the work of art to stimulate the observer's perception in a precise manner, his/her response cannot be fully predicted, leaving the most important sensory aspects to chance.

Chance then acts both through the free interpretation of the work of art that the observer provides and through the various electronic mechanisms that create the movement in the artwork itself. Thanks to the kinetic element it is impossible to return to the initial aesthetic situation, and every cycle of movements always creates a new situation and new combinations. Another good example of this role of chance is Boriani's aforementioned project *Superficie magnetica* (see Chapter 2, section 2.3 and Chapter 3, section 3.3) where, besides the role of the observer, the function of the magnets, moving the iron powder and determining new casual aesthetic situations, is also evident (fig. 91).

Taking together the analyses of artworks and the discussion of the inner duality between programming and chance it appears evident that this Italian tendency was characterised by opposite vectors. The first vector – the programming activity – acts from the point of view of the artist through the artwork towards the observer, while the second – the element of chance – operates from the observer towards the artwork. In the first case the artwork represents the means for the study of the behaviour of the onlooker, while in the second case it is the means for his/her active participation.

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[484] 'In uno spazio quadrato di luce blu fissa, quinte orizzontali e verticali ruotano su uno dei lati lunghi, a varie velocità, generando sempre diversi rapporti tra luce e ombra. Le immagini sono filtrate attraverso un vetro rigato'. See *Arte cinetica. Arte programmata. Opere moltiplicate. Opera aperta*, exhibition catalogue.

The vector metaphor helps to visualize and comprehend the grade of reciprocal dynamism that characterises the relationship between the artwork and the observer even more.

The observer's interaction also distinguishes itself on a manifest level of entertainment: the possibility to *play* with the artwork by perceiving its dynamism, touching, or modifying it, represents a method to engage the observer, but also exemplifies the aforementioned tendency of people in the 1960s to familiarize themselves with technological items. This relationship helps develop a new way of communication with the help of machines and evolves a new technological and industrial aesthetic taste. This ludic feature is a constant of this production since the beginning of programmed artists' career. One of the first experiments by Devecchi in 1959, *Scultura da prendere a calci*, displayed during 'Miriorama 3' in 1960, highlights the study of an engaged and ludic observer's participation with a sculpture on the floor that needs to be kicked (fig. 92 and 93). These are 8 isomorphic and isometric modules connected with rubber bands that make up a parallelepiped in turn held by a long rubber band: one or more kicks rapidly and randomly change the shape of the sculpture.[485] Playfulness, then, can be surely connected with the idea of chance and the observer's subjectivity, identifying Arte Programmata as a harmonizing tendency amongst programming, research, education, chance, and entertainment. The idea of the relationship amongst playfulness, shapes and movements also emerges from the documentary directed by Enzo Monachesi concerning the first exhibition of Arte Programmata at the Olivetti store in Milan in 1962.[486] In one sequence, a little girl was filmed while she was interestedly following the kinetics of Munari's work *Colonna con 9 sfere* (fig. 94 and 95), where nine transparent plastic spheres are held in a column by a vertical structure and moved by an electric motor.[487] White segments are applied on the spheres and, rotating together with them, always assume different visual configurations (chance element), but always within a certain number of foreseen possibilities (programming element).[488] This image recalls once more the idea of programmed installations as a form of entertainment, emphasizing Munari's role and influence in the Arte Programmata production, especially his interest in the production of objects that can be ludic and didactic at the same time (see Chapter 3, section 3.1).

It is possible to connect from these deductions programmed experimentations to the already-cited tendencies to communicate highly didactic contents to entertain the observer typical of the

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[485] Source: http://www.reprogrammed-art.cc/library/46/Scultura-da-prendere-a-calci [accessed 18 March 2019] and http://www.gabrieledevecchi.it/opera.php?idO=35 [accessed 18 March 2019].
[486] The documentary *Arte Programmata* (1963) was directed by Enzo Monachesi and produced by Lo Studio di Monte Olimpino, Laboratorio di Cinema di Ricerca: the theme was written by Munari, the screenplay by Marcello Piccardo and the music by Luciano Berio (1925–2003). The short film (10 minutes long) was published on YouTube in 2013 by the Archivio Nazionale Cinema d'Impresa. Source: https://www.youtube.com/watch?v=iji_cT9L6RQ [accessed 14 May 2019].
[487] The little girl was Soavi's daughter.
[488] For a full explanation of the functioning of this artwork, as well as a detailed scheme of its structure please refer to See Bruno Munari, *Arte come mestiere*, pp. 246-247.

exhibitions of the period. In fact, the great interest in and the debate about the definition of recreational activities and the development of effective and conscious ludic means in the 1960s, caused by the increase in media and technology, cannot be forgotten. The perceptual gymnastics and the amusement offered by the programmed experience seems thus to embody the principal themes discussed in this period in Italy (see Chapter 1, sections 1.1 and 1.2).

The idea of training the human perceptual capabilities through the combination of programmed movements and random reactions seems to have another important function, to make the observers conscious of the inner instability characterizing the environment around them. This is definitely a crucial aesthetic function and aim of the movement. In the description of the present-day value of Arte Programmata in the *Almanacco Bompiani 1962*, Eco – as already quoted – describes the modern human being as gifted with thousands of eyes that help him/her to survive in an unstable word characterized by a plethora of stimuli.[489] This conception, then, encourages a reflection on the natural laws that govern our environment. The 1960s man – defined as 'abitatore inquieto di un *expanding universe*'[490] – thanks to art has the right tools to increase awareness of the unpredictability of the nature and the world around him/her.[491] In fact, in the passage taken from Eco's programmatic text for the Milanese exhibition of 1962, a reference is made to the physical laws that regulate the environment as a perfect example of the balanced coexistence between programming and chance. In fact Eco informs us that in nature random phenomena whose course is predictable on the basis of statistical rules occur.[492] Art, therefore, stands as a metaphor for nature by imitating its own rhythms and its own dynamics. In nature, as in Arte Programmata, every event and phenomenon are rationally explainable and predictable, but some derivations and consequences are expressed randomly and without a precise mathematical determination. Chance can then be considered as a metaphor for the inevitable and unavoidable entropy of the universe which measures the degree of disorder of a system, reinforcing once again the repeatedly stressed link between Arte Programmata and science, already mentioned before introducing the concept of entropy. Florentine critic Laura Vinca Masini (1923–2021), in her *Domus* article of 1965 *Arte Programmata*, seems to recall Eco's words when she

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[489] Umberto Eco, 'La forma del disordine', *Almanacco Letterario Bompiani 1962*, pp. 175-189 (p. 187).
[490] Ibid.
[491] Munari in its book *Arte come mestiere* focussed on the importance of knowing the rules that preside over the natural world to acquire a better understanding of the surrounding environment as well as the humans themselves. In fact, in the book's section 'Design di ricerca' - whose approach recalls the essay from Argan *Arte come ricerca* - Munari illustrates how plants give 'tutta una serie di informazionisul perché di certe forme e dic erte disposizioni'. By using a lexicon which recollects the concepts of becoming and structural evolution, which so clearly reminisce the characteristics of the programmed artworks, the author specifies that 'studiare le strutture naturali, osservare l'evoluzione delle forme può invece dare a tutti la possibilità di capire sempre più il mondo in cui viviamo' See Bruno Munari, *Arte come mestiere*, pp. 177-178.
[492] 'In effetti si danno in natura fenomeni che avvengono a caso e di cui tuttavia è prevedibile il decorso in base a regole statistiche, che appunto misurano con un sufficiente margine di certezza matematica il disporsi degli accadimenti casuali'. See *Arte cinetica. Arte programmata. Opere moltiplicate. Opera aperta*, exhibition catalogue.

suggests that the alternation of programming and chance leads, inevitably, even in the most sophisticated design to a general sense of instability that characterizes the artwork:

> In altri termini, opera programmata è quella che presenta una successione di situazioni visuali diverse che si ordinano secondo uno svolgimento cronologico imprevedibile, sia pure con varianti in un ambito di situazioni che possono essere più o meno previste completamente dall'autore (secondo, dunque, una funzione x o n). L'opera conserva, tuttavia, anche con una programmazione molto elaborata, e quindi prevista al massimo, un carattere di instabilità che le dà una sua vita propria.[493]

The poetics of openness therefore, as Eco specifies in *Opera aperta*, foresees a certain tendency towards disorder and randomness, but we must always deal with a disorder 'dominato', what Eco calls a 'dialettica pendolare'.

Dorfles, in his contribution to the catalogue of the exhibition 'Oltre la pittura, oltre la scultura. Mostra di ricerca di arte visiva' held in 1963 at the Galleria Cadario in Milan, chooses the same term – *instability* – to describe one of the most evident outcomes of programmed research. In his piece, an extract from an article written initially for the periodical of the Dutch artistic group *Zero* in December 1962, Dorfles underlines how the instability produced by the virtual or real dynamism of programmed works can be found in many other situations and in many other fields of research:

> Oggi recenti conquiste nel settore della fisica e della psicologia della percezione hanno trovato una rispondenza in opere come quelle che stiamo analizzando […] Ma è soprattutto l'elemento della instabilità fenomenica, ottenuta attraverso accorgimenti statici in Getulio, in Castellani e nella Maino e nel gruppo N, come è ottenuto attraverso accorgimenti dinamici nel gruppo T e – in alcune opere di Munari a risultare il più significativo.[494]

The controversial duality between programming and chance or order and entropy is evident even in the title of Eco's article: *La forma del disordine*. In Eco's words it is clear, then, that there is a need to accept the inner dichotomy characterizing every aspect of life and, most importantly, that art has the duty to represent it.

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[493] See Laura Vinca Masina, 'Arte Programmata', *Domus*, pp. 40-46, (p. 46).
[494] See '*Oltre la pittura, oltre la scultura. Mostra di ricerca di arte visive*, (Milan: Galleria Cadario, 1963). The exhibition took place between the 26th of April and the 17th of May 1963. The brochure can be consulted online along with that related to the second stage of the exhibition that took place in Turin in June 1963. Source: https://archiviodadamaino.it/documenti/ [accessed 2 May 2019].

This strong connection between the idea of entropy in art and the operating way of nature led some programmed artists to describe programming activity with images taken from the natural environment. Anceschi, interviewed by Meneguzzo in 1995, remarking on the importance of movement and chance for the introduction of the observer's initiative, compares the programmed experience offered by his group to 'una natura artificiale, come guardare un tramonto fabbricato'. With these words the artist recognizes a resemblance to the laws of order and chaos dominant in nature in the functioning of the kinetic objects.[495] What changes here is the introduction of the technological element that contributes to the increase of this conflicting relationship. Munari, during the same cycle of interviews conducted by Meneguzzo, also relies on a natural metaphor when defining the concept of programming. He considers the tree as a clear example of programming: as with a programmed artwork, it is characterized by ordered and defined cycles in which it itself modifies but, at the end of each mutation, it always produces a different effect.[496] With these words Munari describes programming as a series of ordered actions and sequences that nevertheless determine different results at the end of each variation.[497] Critic and curator Vergine in her book *L'Arte in gioco*, a volume that collects reviews and articles published in newspapers, weekly and monthly magazines from 1960 to 1987, proposes a definition of Arte Programmata as a plastic analogy of the phenomenic processes that occur in nature:

> L'arte programmata punta sui processi fenomenici che scaturiscono dalla natura stessa delle cose; del loro intrinseco dinamismo propone, attraverso realizzazioni ricche di indicazioni prospettiche multiple, un'analogia plastica. Le entità naturali vengono mutate in entità culturali per aiutare lo spettatore ad appercepire il campo fenomenico nel quale è collocato, tramite sistemi sintetizzabili nella formula stimolo-reazione. Gli autori progettano modelli che intendono svolgere una funzione sociale – la smitizzazione – ed una conoscitiva – porre il pubblico in una situazione percettiva e, pertanto, di consapevolezza.[498]

It is important to underscore, along with the reference to nature and its mechanisms, how the critic refers to Arte Programmata as a movement with a social, didactic, and cognitive purpose. Programmed art with its alternation of order and chance and with its technological aspects helps the

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[495] See *Programmare l'arte: Olivetti e le neoavanguardie cinetiche*, ed. by Marco Meneguzzo, Enrico Morteo, Alberto Saibene, p. 125.
[496] Ibid., p. 136.
[497] As already introduced in the footnote 491, the surrounding nature offers valid examples to understand how to interpret reality and art. In the section 'Design di ricerca' in the volume *Arte come mestiere* Munari detailed the progressive growth of a tree highlighting its astonishingly precise and rational structure. See Bruno Munari, *Arte come mestiere*, pp.179-182.
[498] See Lea Vergine, *L'Arte in gioco, La funzione del critico il ruolo dell'artista* (Milan: Garzanti, 1988), pp. 175-183.

observer to have the correct tools to interpret the phenomenal world that surrounds him/her. The didactic contribution of the programming activity is therefore strictly connected to the phenomenal investigation conducted by artists, making Arte Programmata a real metaphor for the phenomenal world. Apollonio also seems to agree with this interpretation: in the pages of the magazine *Marcatrè*, summarizing the activity of the Gruppo T, he highlights the role of chance as 'esemplato sul reale'.[499]

Based on what has been discussed so far on the concept of programming, the interdisciplinary nature and approach of the Arte Programmata research appears even more evident. The study of the natural balance between chance and order, the interest in science and the study of human perception, the importance of cybernetics as a tool for understanding human functioning, as well as semiotics and aesthetics all make Arte Programmata a modern artistic movement, in line with the changes of its time. Dorfles, in his article *Preambolo all'arte programmata*, published in the *il Verri* magazine in 1966, very clearly announces 'un'urgenza d'interdisciplinarietà' and 'di capovolgimenti percettivi' as an instigation towards a type of kinetic and space-time research.[500]

What has been thoroughly demonstrated so far is the interest of the artists in a space-time investigation that involves the artistic object. Through plastic research – as expressed in Gruppo T's programmatic text and as underlined by Group N in their 1961 programmatic declaration at the *XII Premio Lissone* – they aimed to investigate how the relationship between space and time was perceived by the observer. The breaking of the temporal cyclicality deriving from the programming of a certain series of movements through the introduction of chance is often the result of the physical observer's interaction, but it can also be determined by the unexpected outcome of a programmed kinetic sequence. These types of spatial and temporal interactions determine during the process a condition of instability in the work of art which appears not as an object per se, but as a series of dynamic and unstable spatial and temporal situations. In Varisco's work *Sferisterio* (1960) the introduction of chance is determined by the observers' hands which can interrupt the regular sequences of the round white elements by acting directly on the artwork surface to create unlimited new combinations (fig. 96).[501] This determines a spatial and temporal fluidity that makes the work dynamic. Programming activity in this work begins in the artist's studio where the piece is designed and where future possibilities of interaction with the public are planned. It continues then afterwards in the exhibition space where the artwork expresses in its material reality what was previously designed: programming sets the conditions for the work of art to continue to change and for the observer to be engaged from a perceptual viewpoint by the different inclination of the ping-pong

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[499] See Umbro Apollonio, 'Proposte strutturali', *Marcatrè*, 14-15 (1965), 258-259 (p. 259).
[500] Gillo Dorfles, 'Preambolo all'arte programmata', *il Verri*, 22 (1966), 3-8, (p. 7).
[501] Source: http://www.reprogrammed-art.cc/library/101/Sferisterio [accessed 20 May 2019].

balls of the *Sferisterio* that produce differentiated shadows based on their positions. This concept is also expressed by Boriani, who in 1965 wrote that:

> Un'opera cinetica programmata non è una scultura messa in movimento, non è una struttura fissa, alla quale il movimento viene sovrapposto, ma una strutturazione spazio-temporale fruibile come sequenza d'informazioni visive, irreversibile e di durata illimitata […] Con l'opera cinetica programmata si vuole stabilire un rapporto fra due polarità dinamiche, cioè tra il divenire dell'opera e il divenire dei processi percettivi e apercettivi del fruitore […].[502]

The 'divenire dell'opera' and the observer's 'divenire dei processi percettivi' develop then both in time and space. Time acts on the artwork through its kinetic component, while spatial interactions are due not only to the physical changes the observer makes to the work of art or to the modifications that the artwork itself endured, but also to the way the onlooker acts and reacts in front of the work, moving through and occupying an exhibition space. It is also necessary to concentrate on Boriani's definition of a programmed work of art as a 'strutturazione spazio-temporale fruibile come sequenza d'informazioni visive', recalling what was already introduced by Eco and Bense on the modern aesthetic definition of the work of art as a set of semiotic information destined to dialogue with the observer. This argument will be analysed in depth in the second part of this chapter.

4.2 A New Approach to Programming: the Modal Theory of 'correality'

After a general overview of the concept of programming, the purpose of this section is to propose an innovative and modal approach to defining programming activity. The aim is to analyse in depth the idea of programming as a semiotic mode and thus a rational method for the fulfilment of the programmed work of art itself. I will examine in depth the already mentioned concept of aesthetic reality or 'correality' – namely the totality of signs or ontological units with semantic, syntactic, and communicative value that characterises the artwork – as a semiotic concept of mode. The semiotic concept of mode has the purpose of analysing the communicative action of the work through its constituent semiotic elements, the structure, and the functions they generate. The technique expresses

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[502] Davide Boriani, 'Programmazione nell'opera cinetica 1965', 136-137 (p.136).

through the general science of signs how these signs generate meanings, transmit them, and are interpreted.[503]

The mode in which the work is created and conceived from the beginning in the studio reveals itself to the observer through the subsequent phase of programming in action, making this design process fundamental in order to outline this artistic movement ontologically. The modal approach of programming is defined by Eco in his theory of *open work* and notably in the essay *Del modo di formare come impegno sulla realtà* of 1962, where the critic focuses on the modal and structural analysis of an artwork as its real content.[504] By underscoring the comparison between the idea of programming and the modal and semiotic notion of 'correality' we shall cast a light on the intertwined roles of programming activity and the observer's interaction. The modal approach of programming aims to recast our understanding of this artistic movement and attempts to define and differentiate the visual research of these artists from that undertaken by other kinetic groups. The theoretical contributions from Eco and Bense justify and consolidate the modal lens through which to investigate on this activity. Programming is, therefore, focused on the design and the consequent application of aesthetic situations at the same time. This process is uniquely linked to the observer's sensory and perceptive stimulation: through programming the observer acquires a central role in the artistic process once more.

4.2.1 Arte Programmata: the Result of Artistic Operational Processes

As already underscored, Boriani described programmed artworks as sequences of variable images with potential multiple interpretations: in his opinion this feature can be decoded as the structural basis and the evidence of the operative processes constituting programmed artworks themselves. The artist sees the functioning and execution of programmed artworks as the evidence of a previous activity, the programming framework, where sequences, variations, chromatic changes, movements, and viewer's interactions are planned by artists in the studio: here we witness the tearing down of the boundaries between the art object and the public.

Emerges here the artist's desire to show the viewers not a finished work, but an *open work* that evolves in front of them. Eco underscores this concept clearly in his programmatic text for the catalogue of the first Arte Programmata exhibition in 1962: referring to artists involved he states that

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[503] See Crispin Thurlow, 'Multimodality, Materiality and Everyday Textualities: The Sensuous Stuff of Status', in *Handbook of Intermediality*, ed. by Gabriele Rippl (Berlin: De Gruyter, 2015), pp. 619-36 (p. 624).
[504] The essay was originally published on the periodical *Il Menabò* in 1962 and it was successively included in the second edition of *Opera aperta* published in 1967. See, Umberto Eco, 'Del modo di formare come impegno sulla realtà', *Il Menabò*, 5 (1962), 198-237.

they propose constantly changing objects to the observer. The artworks then are created while they are observed and experienced by the public:

> E tanto meglio se i geometri delle forme, i pianificatori delle polveri di ferro, gli architetti delle sfere giustapposte, i lirici dei motorini elettrici che muovono nastri colorati, olii, superfici di rete, perspex, luci, lastre, tasselli e cilindri, lo avranno abituato a considerare che le forme non sono qualcosa di immobile che aspetta di essere visto, ma anche qualcosa che si fa mentre noi lo ispezioniamo.[505]

Therefore, the observer is in direct contact with the entire creative artistic process, which is finalized by the functioning of the work of art itself and the direct interaction of the viewer (perceptual or physical one). In fact, analysing the concept of *open work*, a work of art is defined as such only if the onlooker contributes directly to its final meaning.[506] The idea is then to make the observer aware of the artistic and formative process in progress through programming: the physical and conceptual functioning of the work of art is effectively revealed through programming, making it fully accessible to the observer. Colombo clearly expresses this concept by stressing how contemporary art has finally reached autonomy from the now obsolete necessity of representation, beginning to focus on its formal structure and how this is perceived by the observer:

> Va osservato che la cultura visiva del nostro tempo ha già raggiunto, e non da poco, la liberazione dal soggetto preesistente e quindi l'abbandono della rappresentazione. […] Se questa tendenza, in un primo tempo, ha coinciso con la presentazione di forme irriverenti armonicamente composte […] in seguito ha polarizzato maggiormente il suo interesse verso i problemi strutturali della visione nel rapporto opera-spettatore, […] venendo a estendere al pubblico lo spettacolo che i problemi formali dell'opera stessa riescono a suscitare.[507]

Programming is then ontologically crucial for the programmed artwork: it is the mode in which the artwork is created and the mode by which the work determines its features when it is operative. Through programming, therefore, the work of art is able to fulfil the role that it has to assume in the modern age: to develop in the mind of the observer a reflection on the formal structure and relational

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[505] See *Arte cinetica. Arte programmata. Opere moltiplicate. Opera aperta*, exhibition catalogue.
[506] 'L'uomo diventando sempre più responsabile del suo mondo diventa sempre più responsabile anche del suo aspetto (visivo, tattile, sonoro). L'uomo diventa sempre più manipolatore del suo ambiente'. See Giovanni Anceschi and Davide Boriani, 'Tentativo di definizione 1964', *il Verri*, 22 (1966), 121-126, (p. 122). This speech was presented by the two artists at the Congresso artisti e critici d'arte in San Marino in 1964.
[507] See Gianni Colombo, 'Sulle ricerche plastiche cinevisuali 1964/65', pp. 127-131 (p. 128).

problems of a work of art. The work of art therefore expresses itself thanks to the mode in which it is programmed and communicates its own modal structure to the observer who should appreciate and understand the planning value of the work rather than the symbolic or general one. Dorfles also expresses himself in these terms when, in the *Le oscillazioni del gusto. L'arte di oggi tra tecnocrazia e consumismo*, he underlines how: 'La forma artistica di solito si comunica attraverso la sua stessa struttura e in virtù della sua immissione entro un particolare contesto che ne accresce o ne rinnova il valore informativo'.[508]

To effectively frame the role of programming as a mode and its different stages, it could be useful to compare the definition of Arte Programmata by Boriani with a description of the concept of 'aesthetic reality' defined by Bense. In the article 'Progetti di estetica generativa', published in *il Verri* journal in 1966, Bense introduces the idea of 'analytic aesthetics' and 'generative aesthetics' as the two fundamental steps in the definition of a rational and semiotic idea of aesthetics. Bense's aim with his work is to define and frame the idea of a rational and mathematical aesthetic: to do this it is crucial to precisely understand the role of two concepts he introduced and used in his writings. The 'material vehicle' and the 'aesthetic situation' are in his opinion two essential components of the complete ontological realization of a work of art. While with 'material vehicle' Bense refers to the material components of an artwork that have the role of literally acting as 'vehicles' of the aesthetic messages of the artwork, the notion of 'aesthetic situation' has to be split in two different definitions.[509] With the concept of 'analytic aesthetics', Bense indicates the design and programming of aesthetic structures that will produce aesthetic information with the physical enactment of the artwork. With the term 'generative aesthetics' he refers instead to all these operations, rules, and theorems that, thanks to the material support of the artwork, can be operative, generating signs and aesthetic situations directly perceptible and detectable by the onlooker during the enactment:

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[508] Gillo Dorfles, 'Le oscillazioni del gusto. L'arte di oggi tra tecnocrazia e consumismo [1970]', in *Estetica senza dialettica: scritti dal 1933 al 2014*, pp. 317-426 (p. 402).

[509] Using similar words, Munari defines its personal concept of visual communication in its work *Design and comunicazione visiva* of 1968. Similarly to Bense's theory, which recognizes the presence within the work of art of a physical vehicle of the aesthetic information and of an actual aesthetic reality, Munari defines the aesthetic information of an object and clarifies the importance of its clear and effective communication for it to be comprehended by all. Therefore, the visual support becomes responsible for sharing the aesthetic knowledge with the observer: 'Se dobbiamo studiare la comunicazione visiva sarà bene esaminare questo tipo di messaggio e analizzarne le componenti. Possiamo dividere il messaggio, come prima cosa, in due parti: una è l'informazione vera e propria portata dal messaggio e l'altra è il supporto visivo. Il supporto visivo è l'insieme degli elementi che rendono visibile il messaggio, tutte quelle parti che vanno considerate e approfondite per poterle usare con la massima coerenza rispetto all'informazione'. See Bruno Munari, *Design e comunicazione visiva. Contributo a una metodologia didattica* (Bari: Edizioni Laterza, 1968), pp. 81-86. Design e comunicazione visiva is a piece created from about 50 lessons on the subject of visual communication, held by Munari after invitation from Harvard University at the Carpenter Center for the Visual Arts in Massachusetts between February and May 1967.

Oggi non abbiamo solo una logica matematica e una linguistica matematica, ma a poco a poco si è sviluppata anche un'estetica matematica. Poiché essa, per quanto riguarda l'opera d'arte, distingue tra il 'veicolo materiale' e la sua 'situazione estetica' realizzata con questo, non procede più interpretando soggettivamente, bensì constatando oggettivamente. […] Per estetica generativa è ora da intendere il complesso di tutte le operazioni, regole e teoremi, mediante la cui applicazione su una moltitudine d'elementi materiali che possano fungere da segni, sono producibili consapevolmente e metodicamente delle situazioni estetiche […]. È chiaro che ogni estetica generativa, che naturalmente rende possibile una sintesi estetica, è preceduta da un'estetica analitica, mediante la quale vengono preparate come informazioni estetiche le strutture estetiche di opere d'arte pre-date, che ne sono portatrici.[510]

To compare these definitions with Arte Programmata it could be useful to analyse a programmed artwork as an example. Devecchi's *Superficie in variazione* of 1959 (fig. 97, 98, and 99) is constituted by an elastic surface of natural rubber where steel pins are planted – depending on the piece produced – in a regular alignment or following a spiral shape. Pins move as a result of the motorized passage of a propeller that is programmed to rotate under the rubber breaking the ordered alignment of the pins. Initially in 1959, when the artist started to work on this project, the artwork was moved by a mechanism triggered directly by the audience pulling a string that activated a manual propeller. As a result of the elasticity of the surface, all pins set back to their original positions at the end of each sequence activated by the viewer or by the motor.[511] The kinetics of the artwork, due to the movement of pins, causes an alternation of lights and shadow on its surface making the object different every time, making it appear as fluid and changeable. In this specific case the programming mode, or what we can call 'analytic aesthetics' can be identified in the forecasting of the activation movements of the steel pins – calculating also the following random kinetic sequences of the pins that could derive from the enactment – and in the design of each step of the observer's interaction that can be both haptic and perceptual. The second stage of programming, or 'generative aesthetics', can be identified in the practical application of what the artist has planned before in his studio, in the exact moment when the work is put into operation, generating the previously planned aesthetic processes.

In this specific object the onlooker's engagement is planned and occurs on three different levels. Firstly, the observer's haptic interaction lies in the mechanical activation of the motor through the little cord (only in the first edition of the object); secondly, the work is planned to be touched on its surface by the observer who can experience the tactile perception of the dynamism of the pins (fig.

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[510] See Max Bense, 'Progetti di estetica generativa', *il Verri*, 22 (1966), 17-23, (pp.17-18).
[511] Source: http://www.reprogrammed-art.cc/library/25/Superficie-in-vibrazione [accessed 29 May 2019].

100); thirdly, the observer is programmed to be engaged through the movements of the needles and through the changes in terms of sound, lights and shadows on the object surface.

Starting from Bense's definition of 'analytical aesthetics' that we can relate to the first phase of the programming activity, we ought to highlight again the importance of the word *structure*. In the essay *Del modo di formare come impegno sulla realtà* of 1962, Eco states that 'Il primo discorso che l'arte fa è attraverso il modo di formare', that the only meaningful way in which art can speak of today's man and his/her world is by organizing its forms in a particular way and not by making proclamations with them.[512] The real content of an artwork is its way to describe the environment around it and the most efficient manner to do it is through its formal structure, its mode of creating the artwork itself. Eco indeed states that:

> Il vero contenuto dell'opera diventa il suo *modo di vedere il mondo* e di giudicarlo, risolto in *modo di formare* […] L'arte conosce il mondo attraverso le proprie strutture formative (che quindi non sono il suo momento formalistico ma il suo vero momento di contenuto).[513]

The mode in which a work is made, or, in our case, its programming of future functioning, is the true content, the true essence of a work of art. The example of Arte Programmata therefore gives full value to Eco's words, providing a clear practical example for his theoretical ideas. Programming, then, is the mode of creating aesthetic structures that constitute, both potentially and in action, the meaning of the programmed artwork. Instead of being just a secondary technical feature, the structure of the aesthetic sequences that constitute the work becomes the primary characteristic of the artwork itself as well as the representation and the model of the world in which it is developed.[514] This idea of the inner modal structure of programmed artworks as their real contents is evident even in the titles of the works produced by Gruppo T and Gruppo N. One of the most used words to title them is *Strutturazione*: for instance, we can list the already mentioned *Strutturazione cilindrica* by Anceschi as well as *Strutturazione acentrica* and *Strutturazione pulsante* by Colombo. Eco in his text also claimed that the artwork is 'una struttura *aperta* che riproduce l'ambiguità dello stesso nostro essere-nel-mondo: quale almeno ce lo descrive la scienza, la filosofia, la psicologia, la sociologia'.[515] This

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[512] Eco, *Opera aperta. Forma e indeterminazione nelle poetiche contemporanee,* p. 266.
[513] Ibid., p. 270.
[514] '[…] L'avanguardia artistica è l'unica a intrattenere un rapporto di significazione col mondo in cui vive'. See Ibid., p. 264. 'Nel momento in cui l'artista si accorge che il sistema comunicativo è estraneo alla situazione storica di cui ci vuole parlare, deve decidere che non sarà attraverso l'esemplificazione di un soggetto storico che egli potrà esprimere la situazione, ma solo attraverso l'assunzione, l'invenzione, di strutture formali che si facciano il modello di questa situazione'. Ibid., p. 269.
[515] Ibid., p. 283.

reference to ambiguity can be linked with the idea of instability offered by the programming activity and, above all, by the planned alternation of programmed kinetic sequences and chance.

Programming, then, as a mode, acquires a double role: it determines the ontological nature of the artwork as a set of semiotic sequences, and, when it is operative, the transmission of semiotic information. In fact, every feature of the modal structure of an artwork, such as lights, rhythm, movements, or colour variations is considered by Bense as a semiotic sign which transmits semiotic information. In his article 'La teoria dei segni come fondamento della nuova estetica' in *il Verri*, the German philosopher focuses the attention on the strong relationship between art and communication specifying how all the elements used for the realization of an artwork must be considered as communicative features. Therefore, it is of fundamental importance to use the signs correctly and in a rational way for a functional aesthetic communication:

> Ogni informazione sulla cui mediazione si basa la comunicazione, è costituita da 'segni'. Tutti gli elementi impiegati per la produzione di un'opera d'arte, come suoni, colori, parole, contrasti, linee, forme, modulazioni e così via, sono da intendere come 'segni'. Solo i 'segni' insomma possono fungere in uno schema di comunicazione. Affinché tuttavia questa funzione dei 'segni' sia controllabile conoscitivamente ed esteticamente, è necessaria una teoria esatta dei segni (semiotica) come fondamento specialmente anche dei punti di vista teoretici della comunicazione e dell'informazione sull'opera d'arte.[516]

Reflecting on the idea of programming as a communicative act, its importance as a set of meticulously and scientifically organized signs becomes crucial. Programming therefore acquires importance as a connecting element between the physical object and the observer.

In his rational framing of a new kind of aesthetics, Bense identifies three types of relationship for each aesthetic sign. A sign is used as a means to convey information; but it is also used to dialogue with the material component of an object, and to dialogue with a possible interpreter.[517] Probably inspired by his lesson, in fact, Anceschi and Boriani, in their speech published on *il Verri* in 1966 defining themselves as 'Ricercatori di semiotica sperimentale visiva', highlight their interest in working on signs, underlining relational value of signs, both among themselves and between them and those who receive and interpret their semiotic messages:

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[516] See Max Bense, 'La teoria dei segni come fondamento della nuova estetica', *il Verri*, 22 (1966), 9-16, (p. 13).
[517] Ibid. 'Qualsiasi cosa, un suono, un contrasto, una parola, un'immagine, una maschera, è un segno se può venire usato in primo luogo come 'mezzo', in secondo luogo in rapporto a un 'oggetto' e in terzo luogo in rapporto ad un 'interprete'. 'Mezzo', 'rapporto oggettivo' e 'rapporto interpretativo' di alcunché costituiscono la sua 'relazione segnica triadica'.

[…] Di semiotica in quanto ci occupiamo di segni. In particolare di sintattica in quanto ci occupiamo delle relazioni fra segni, di pragmatica in quanto ci occupiamo dei rapporti che intercorrono fra segni e interpreti. Sperimentali in quanto utilizzando strumenti già esistenti dovremmo verificare, misurare, i risultati degli esperimenti che costruiamo.[518]

Here we highlight a close similarity between Bense's aesthetic theories and the research in which Arte Programmata artists are involved. It is important to underline the reference to their role as researchers and to the use of semiotics as an approach to their investigation made by the two artists. This involves the close relationship between observers and signs, highlighting the communicative role of Arte Programmata and its interdisciplinary approach. It is necessary to remember how the idea of art as a form of communication has already been introduced in this thesis in the discussion addressed on the critical production of Dorfles where the Milanese critic emphasizes the crucial role of art as a form of triadic communication amongst the author, the work of art and the observer (see Chapter 1, section 1.3).

The entirety of all the signs characterizing an artwork as a mode (both potentially and in action) constitute its aesthetic reality and is defined by Bense with the term of 'correality':

Ora il 'segno' […] il cui carattere modale è stato designato col termine 'correaltà' – questo segno, dicevamo, funziona nel senso di una dimensione sintattica (relazione con altri segni) di una dimensione semantica (relazione con i significati) e di una dimensione pragmatica (relazione con l'uomo e la società) e cioè comunicativa.[519]

As explained by the German philosopher in his main work *Aesthetica*, the real beauty of a work of art can be only identified in the way in which the work is produced and made perceptible, and this happens using signs. Signs, from a modal viewpoint, represent the real content of a piece of art, its 'correality'. There is no kind of imagination or subjectivity in the theorization of beauty besides the process of its realization and the definition of its aesthetic features. The triple function of the sign identified by Bense in the quotation above from *Aesthetica* – the syntactic, semantic and pragmatic functions – recalls what has been stated by Eco in the introduction to the second edition of his book *Opera aperta* in 1967 where he claims that the structure of an artwork is characterized by a system of semantic, syntactic, physical, and emotional levels.[520] To exemplify this concept, it is useful to

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[518] See Giovanni Anceschi and Davide Boriani, 'Tentativo di definizione 1964', 121-126 (p. 125).

[519] See Bense, *Estetica*, p. 205.

[520] Adding that a piece of art is essentially a totality of different relationships: 'Si parlerà così di struttura anziché di forma quando si vorrà mettere in luce, dell'oggetto, non la sua consistenza fisica individuale, bensì la sua analizzabilità, il suo poter essere scomposto in relazioni, in modo da poter isolare tra queste il tipo di rapporto fruitivo esemplificato nel

refer to the words used by Anceschi in the definition of his work *Strutturazione cilindrica virtuale* (fig. 101). In his opinion, from a semantic viewpoint, the work can be defined as the realisation of an intention, while from a syntactic one it is defined by the rhythm, the speed and the inclination of the machine. Ultimately, from a psychological and perceptual viewpoint, the artwork is the means to test the perceptual uncertainty of the visitor in a situation of volume dynamism.[521] This example helps to clarify the triple function of the sign and understand how the modal concept of 'correality', expressed through the theory of signs, is paramount to frame the artwork from an ontological, communicative and perceptual viewpoint.

Furthermore, with the contribution of the German philosopher, the dichotomy between scientific and philosophical reflections about the concept of art could be overcome (as introduced also by Moles with his definition of the artist as a 'programmer of the beautiful'). As explained by Bettina Theirs in the chapter 'De la "Programmation du Beau" de Max Bense à la poésie des ordinateurs' from the book *Poesia e nuovi media*, Bense combines the statistic information theory deduced by Claude Shannon in 1948 – where a piece of information can be only analysed from a statistical and probabilistic viewpoint – with the semantic contribution brought by the information itself.[522] In *Aesthetica* Bense specifies the interconnection between semiotic and information theory; their common aim is in fact to create communication:

> È noto che segni e informazione, semiotica e teoria dell'informazione, sono interconnesse. In tal senso è anche naturale in estetica passare dai problemi del segno ai problemi dell'informazione. […] I segni e l'informazione portano alla comunicazione. Si tratta di una connessione che funziona nel mondo dell'estetica in un modo almeno altrettanto certo e preciso che delle telecomunicazioni.[523]

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modello astratto di un'opera aperta'. See Eco, *Opera aperta. Forma e indeterminazione nelle poetiche contemporanee,* p. 21.

[521] 'La struttura virtuale cilindrica è un oggetto cinetico polimaterico che viene mostrato al pubblico. Ma volendo analizzarlo bisogna articolarlo nei suoi differenti aspetti: a) dal punto di vista semantico la strutturazione non dovrebbe essere altro che la presentazione di se stessa, o meglio nient'altro che la realizzazione di un'intenzione. […] b) sul piano sintattico è necessaria per un oggetto cinetico una ulteriore distinzione tra sintassi spaziale e sintassi temporale. La sintassi spaziale dell'esacono è il risultato di alcune operazioni di simmetria tridimensionale. La sintassi temporale consiste nella scelta dei ritmi di oscillazione delle velocità di rotazione. c) dal punto di vista psicologico la strutturazione è il tentativo di porre lo spettatore attraverso l'insicurezza percettiva […] in una situazione dinamica della percezione dei volumi'. See Giovanni Anceschi, 'Su un oggetto da esposizione: la struttura cilindrica virtuale 1963/4', *il Verri*, 22 (1966), 119-121, (p. 120).

[522] Bettina Theirs, 'De la 'Programmation du Beau' de Max Bense à la poésie des ordinateurs', in *Poesia e nuovi media,* ed. by Francesco Giusti, Damiano Frasca and Christine Ott, 8th edn (Florence: Franco Cesati Editore, 2018), pp. 79-90 (p. 82).

[523] See Bense, *Estetica*, p. 182.

The combination of semiotic and information theory demonstrates that it is possible to have the inclusion of the art processes within the general structure of communication, attributing even more value to the idea of 'correality' as a form of communication.[524]

Bense proposes a programmable and quantitatively definable aesthetic concept of beauty, characterized by aesthetic signs as units of measure. In his theory, each sign is an information bearer, and this information can be described mathematically. In his opinion, every artwork can be identified by its aesthetic reality, while its physical features act merely as a support to the aesthetic information.[525] As specified by Anceschi in the introduction of Bense's book, 'correality' is 'something more' than the simple material reality of the artwork, it is the mode of its ontological presence. Art, then, can be considered as a theoretical activity in Bense's work where the ways to reflect, create, programme, and communicate are more valuable than the mere material results.[526]

4.2.2 Programming as a Semiotic Resource and a Form of 'correality'

It is clear how art, in Bense's opinion, may be considered only from a modal and structural viewpoint, and not a material one:[527] 'correality', through the triple function of signs, establishes the ways of producing, communicating, and interpreting the work of art.[528] Similarly programming, through its analytical and generative phase, is the mode of production of the programmed object, its fundamental artistic essence and real content. We are therefore in the presence of what philosopher Giangiorgio Pasqualotto (1946) defines as 'ontologia funzionale': a work of art is ontologically complete through its modal character of the 'correality' which guarantees a clear function to the artistic object.[529] Programming, being the way in which an artwork is planned and expressed, and the moment when the semiotic aim of the work is defined, is a form of 'correality'. Thus, programming represents the moment in which it is determined how a work will express itself by planning and rationally defining its aesthetic aim.

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[524] 'Le conclusioni alle quali Bense perviene, ribadiscono del resto la perfetta corrispondenza che esiste tra la teoria matematica dell'informazione in generale e la particolare utilizzazione che se ne può fare a livello di comunicazione artistica. Tale teoria, infatti, costruendo uno *schema astratto dell'informazione*, permette una descrizione esauriente di *ogni* processo comunicativo […]'. See Giangiorgio Pasqualotto, *Avanguardia e tecnologia: Walter Benjamin, Max Bense e i problemi dell'estetica tecnologica*, p. 19.

[525] In the introduction to Bense's book, Anceschi well underlines the coexistence in a work of art of a physical reality and an aesthetic one: 'Bense promuove dunque un'estetica oggettivante ed esatta, un'estetica che descrive numericamente quella realtà estetica che accompagna ogni realtà fisica e in particolare la realtà fisica degli artefatti'. Bense, *Estetica*, p. 16.

[526] Ibid., p. 9 and p. 15.

[527] In his book *Aesthetica* Bense claims: 'L'intero sviluppo dell'arte moderna ha mostrato che se i nostri discorsi sull'arte vogliono conservare un senso, noi dobbiamo sostituire una definizione sostanziale dell'arte, che passa attraverso l'opera d'arte, con una sua definizione modale e strutturale'. See Bense, *Estetica*, p. 209.

[528] Pasqualotto, *Avanguardia e tecnologia: Walter Benjamin, Max Bense e i problemi dell'estetica tecnologica*, p. 10.

[529] Ibid., p. 42.

The function which is important to dwell upon is the communicative role of 'correality': the role of the communicative importance of programming is emphasized, legitimated, and clarified even more through the aesthetic theory of Bense.[530] Arguably, 'correality' has a fundamental purpose: to create a dialogue with the recipient of the semiotic signs. This is also noticeable in the programming activity where the artist's aim is to create, or to be precise, emit signs and stimuli that must be forwarded to the visitors and, precisely, to their organs in charge of multisensory perception. Bense makes the importance of communication very clear by correlating the idea of the work of art with that of aesthetic information. He states that: 'Le opere d'arte sono supporti, forme della comunicazione di informazione estetica, e le informazioni estetiche sono comunicazioni strutturali'.[531] Therefore the semiotic character of the sign and its communicative potential – which in the case of Arte Programmata is established with the programming of the work in the artist's studio and its subsequent execution in front of the observer – is the true and correct interpretation of a work of art while the physical object represents only the medium through which the aesthetic reality is expressed. The article written by Dorfles 'Comunicazione e consumo', published in the first issue of the magazine *Azimuth*, in 1959, expresses the importance of the communicative function of art, emphasizing its osmotic value in connecting the artistic creator and the public and demonstrating the urgency in those years to attributing a new meaning to the idea of work of art:

> Perchè è soprattutto una funzione comunicativa quella che può permettere il sopravvivere d'un'arte che ha rotto ogni ponte con la rappresentatività e la figuratività tradizionalmente intese. Solo una funzione comunicativa – che non ha bisogno d'essere figurativa o aneddotica, che potrà essere segnica, gestuale, semantica – ma che dovrà pure in qualche maniera permettere quella particolare osmosi dell'evento artistico tra creatore e pubblico.[532]

This analysis leads inevitably to the discussion of another essential feature of Bense's theory: signs from 'correality' must be experienced and executed by the recipient of the semiotic message introducing then the chance element into the aesthetic situation.[533] Since every aesthetic sign conveys

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[530] 'Allora risulta del tutto chiaro che tanto l'oggetto ''naturale'' per diventare ''segno'', quanto l'oggetto estetico per essere compreso in modo appropriato [...] hanno assoluta necessità di entrare in un rapporto comunicativo'. Ibid., p. 29. Programming is nothing more than this: a set of decisions that lead the artistic object to generate previously established aesthetic information. The similarity between the concept of 'correality' and the programming one is therefore clear.

[531] Bense, *Estetica*, p. 318.

[532] Gillo Dorfles, 'Comunicazione e consumo', *Azimuth*, 1 (1959).

[533] Pasqualotto, *Avanguardia e tecnologia: Walter Benjamin, Max Bense e i problemi dell'estetica tecnologica*, p. 26. Bense specifies how this new aesthetic theory produces systemicity, but also new unplanned situations: 'L'estetica, in quanto è una teoria, di fronte ai dati estetici della percezione estetica, [...] assolve il suo duplice compito: introduce ordine

information, the only way for 'correality' to be completed is thanks to the observer's interaction and aesthetic perception. Bense places emphasis on the phoneme 'co-' that identifies the necessity for the aesthetic reality to be communicated and shared for it to be completed and fully understood:

> La particella "con" in "correaltà" indica l'ambito di una percezione, la cui quintessenza consiste nell'interpretazione. L'interpretabilità dell'universo segnico non favorisce soltanto la prima fase dell'opera d'arte, cioè quella della sua produzione; anche il fascino estetico della seconda fase, cioè quella del giudizio, della critica, risiede in tali processi.[534]

This is the moment when the term described by Bense as 'generative aesthetics' acquires its final meaning: during the functioning of a programmed artwork, in fact, aesthetic signs generate information, but they also provoke an interaction and a reaction from the observer. Thanks to the role of 'generative aesthetics' signs favor the ontological definition of the object, its communicability and its subjective interpretation. 'Generative aesthetics', in fact, leads the viewer to contribute to the artistic experience in ways that, as we have explained above, cannot be fully foreseen.

A clear example of a direct interaction of the observer with a programmed artwork is given by one of the magnetic boards created by Varisco, as, for instance, *Tavola magnetica trasparente* of 1961 (fig. 102). The key features of this artwork are simple, linear, and coloured objects that can be freely moved and replaced on a table surface thanks to the presence of magnets. The spectator is thus invited to actively participate in the realization of the work by putting into practice what the artist has previously programmed. This mutual dialogue between the onlooker and the magnetic board resolves into a direct contact that is not only visual but also requires a haptic relationship: thanks to this tactile experience the observer acquires a novel conscience of the gestalt process that the object creates through its three-dimensionality.

Conclusion

As we have seen in this chapter, through the participation of the onlooker, we enter that phase defined by Bense as 'generative aesthetics' where the execution of the work of art by the observer contributes to the introduction of the element of chance in the planned work. The role of chance, as for programming, is equally fundamental for Bense who states that 'ogni singola opera d'arte è una entità estetica libera, più o meno autonoma; esiste, non funziona, e la modalità supplementare che completa

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e sistematicità nei dati della percezione estetica, ma rende anche possibili nuovi e penetranti modi di percezione delle opere d'arte'. See Bense, *Estetica*, p. 43.
[534] Bense, *Estetica*, p. 69.

la sua correaltà è quella della casualità. Arte è correaltà casuale'.[535] 'Correality', as a semiotic resource, is, then, completely executed thanks to the introduction of chance: at the same time programming is directly and unavoidably linked to chance. What appears evident in Arte Programmata is precisely the necessity of the random aspect in the artistic experience: only chance and, therefore, the relative participation of the observer can increase the value of the semiotic information transmitted by the work of art.[536] Chance is then crucial and fundamental in conveying meanings and messages: it helps to explain them to the observer through his/her uncontrolled choices and interactions.

What emerges from the analysis conducted so far is the tendency, in these years, to investigate the artistic product not as a whole, but as a system of interactions where different elements are linked together. The modal approach highlights the need for critics and philosophers for a new rational, scientific, and ordered way to study the work of art. Bense's theorization of 'correality' represents the most convincing way to define and justify the concept of programming as a mode, helping to focus on the important relationship of the observer with the artwork and its functions. Programming, in fact, is the mode to create ontologically the programmed artwork, but it is also the way used by the artwork and the artist to dialogue with the observer and, lastly, it is the link between the observers and the artworks for their active participation to the artistic experience. Bense's research on the authentic aesthetic meaning of the work of art leads to the introduction of further reflections on the relationship between art and observer. With Arte Programmata we observe a dematerialization of the artistic object in favour of a greater attention given to the artistic experience itself. What matters, then, is not the physical object itself, but what it communicates as a semiotic sign and how this information is transmitted. However, at the same time, we are witnessing a direct interaction with the artistic object by the observer and, consequently, a desacralization of the work of art and the breaking down of the boundaries between the space of the work of art and the space of the observer.

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[535] Ibid., p. 51. Pasqualotto explaines this concept underscoring how 'la casualità si pone come funzione di mutamento all'interno dello schematismo modale e che sta a indicare che la struttura dell'opera d'arte è una struttura indeterminata, probabilistica'. Pasqualotto, *Avanguardia e tecnologia: Walter Benjamin, Max Bense e i problemi dell'estetica tecnologica*, p. 13.

[536] See Emanuele Quinz, 'From Program to Behavior: the Experience of Arte Programmata in Italy, 1958-68', in *Practicable, From Participation to Interaction in Contemporary Art*, ed. by Samuel Bianchini and Erik Verhagen, pp. 91-111 (p. 99).

Conclusion: Arte Programmata: a Still Fertile Source for Reflection on the Purpose of Modern Art

1. 'Correality' as Research

This dissertation offered the possibility to precisely define the concept of programming and its role within the Italian art movement of Arte Programmata. Through Eco's theory of *open work* and Bense's concept of 'correality', it has been possible to outline a new concept of work of art in which the purpose of interacting with the observer is crucial right from its first creative phases and that possesses, at the base of its conception, influences of an interdisciplinary and modal nature. In the introductory section of this thesis, it was specified how, in the historical period taken into consideration, the artistic currents focused more on the *mode* of being of a work of art, that is, how it was conceived, created, and communicated. The idea that was emerging was that of a work of art as an *open* and *dynamic system* and exposed to interdisciplinary contaminations. The idea of art introduced was therefore that of a *research process* conducted by the artists for their investigations on the mode of operating of the artwork as well as on the observer.

Returning to the text written by Argan and published for the catalogue of the 'Nova Tendencija 3' exhibition, he describes the works produced by that operative trend as characterised by a 'configurazione geometrica delle immagini e il loro ordinamento secondo progressioni matematiche' and by 'materiali e procedimenti generalmente simili a quelli della produzione industriale in serie'.[537] The scientific approach to artistic activity was therefore aimed at the configuration and design of a *structure* that 'determina le situazioni spaziotemporali in cui verranno a situarsi e visualizzarsi le immagini'.[538] In this dissertation I therefore sought to explain in detail one of the many attempts made in Europe at that time for the definition of a new type of art and a new aesthetics which aimed to comprise all these features. Arte Programmata, as we have seen in the previous chapters, engaged in this research through its focus on the programming activity. The Italian movement, thanks to programming, focused on the two fundamental questions raised also by other contemporary international avant-gardes: the reflection on the aesthetic reality of the artistic object

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[537] Carlo Argan, 'Arte come ricerca', in *Nova Tendencija 3*, pp. 19-22 (p. 20).
[538] Ibid.

as a mode and the inclusion of the observer as an essential and active element of the artistic experience.

The didactic and communicative value of programming and how it lays the foundations for an *open* interaction with the observer has been precisely defined through the in-depth analysis of works of art and programmatic writings. For these reasons, it has been theorized how programming, applying Bense's theories as a methodology, can be defined as a form of 'correality'. Thanks to this approach, the communicative value and the role played by conveyed information – or semiotic messages – to the observer was underlined and justified theoretically and rationally. As a result, the function of the modern observer is re-evaluated, along with that of the artists themselves. The definition and explanation of a rational kind of aesthetics, the delineation of an 'analytical' and 'generative' phase of the work of art – as stages of a scientific experiment – led this thesis to the demonstration, albeit theoretical, of the initial paradigm expressed at the beginning of this dissertation: 'art as research'. At the end of this long discussion, the statement could be improved by introducing the statements 'programming as research' and '"correality" as research'. These two sentences are justified by the fact that programming, as a type of semiotic communication, creates a bond with the observer: the purpose of this link is an investigation into perception, cognitive stimuli and, at the same time, an encouragement for the observers to develop a new level of self-awareness on the proposed research and artworks. Furthermore, 'correality' is a form of research as it determines the possibility for a work of art to be programmable from an aesthetic point of view, thus also defining its ontological nature.

The analysis initially focused on the cultural context of the period, and on some key figures for the theorization of a new concept of art. Eco's theory of *open work* can be considered as a pair of glasses through which to read the entire philosophical and artistic production of the decade and to better understand the Arte Programmata movement. The theory of *open work* attributed a new role to the artistic observer of the 1960s; it democratized the idea of aesthetic consumption and considered the artwork a concrete, epistemological metaphor for the historical moment in which it was created. Therefore, the act of creating reveals the fundamental elements of a civilization and an era: the work itself presents characters that reflect the cultural trends of a specific period.[539]

In the second chapter we witness the progressive development of the idea of programming and its evolving steps. Furthermore, we witness how rapidly the concept of the observer's engagement changed from a more physical interaction to one more oriented to optical illusion and retinal perceptual stimulations. Through the development of the third chapter, it has been progressively demonstrated how Arte Programmata movement was the result of an evolutionary process of

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[539] Umberto Eco, *Opera aperta. Forma e indeterminazione nelle poetiche contemporanee*, p. 4.

experimentation in the artistic field that originated at the beginning of the twentieth century to reflect on kinetics, and on the observer's engagement in space and time. Arte Programmata emerged to theorize this dialogue in a convincing way because of two aspects apparently in counter current with each other: chance and programme. As demonstrated in the fourth chapter, they are both essential for the development of an interaction based on rational criteria. Without chance, therefore, a dialogue with the observer is not possible.

The analysis conducted so far has a limit, namely that of being theoretical, not having considerable practical evidence to bring as proof. I refer in particular to the role of the observer in this receptive process, which cannot be fully understood, analysed, and certified, lacking direct feedback from the recipient of this aesthetic dialogue and proper video sources to investigate their behaviours. In other words, although the interaction is foreseen and programmed by the artist, we cannot be sure of the degree of awareness of the subsequent interaction. We cannot really verify the effectiveness of the communicative and didactic value of the work, just as we cannot be certain of the appreciation and total understanding of these works by the observer. What clearly emerges through programmed works is, instead, the artist's aim to create a new *operating model*, a new interdisciplinary approach to artistic activity, in line with modern times. The truly complex side of this research is to evaluate whether the didactic contribution of the aesthetic processes is truly effective for a complete appreciation and involvement of the observer.

More generally, the movement struggled to find evidence of its concreteness even for the establishment of its subsequent developments and purposes. Its short life was proof of this reflection, but around the mid-1960s the issue of the practical applicability of this peculiar approach was already posed. In the final part of his essay 'Arte come ricerca' Argan in fact remarked:

> […] il rimprovero, che si muove ai ricercatori e ai gruppi di ricerca sulle strutture visive, di fabbricare congegni che funzionano a vuoto e non producono nulla o soltanto l'immagine di quel non-produrre. Si vuole l'oggetto, sapendo perfettamente che, per questa via, sarà facile ricondurre le ricerche sulla struttura della percezione visiva alla disciplina aziendale del 'disegno industriale'[…]La differenza fondamentale tra disegno industriale e ricerche operative nel campo della visione è che il primo mira all'estetica del prodotto, il secondo all'integrazione estetica del processo.[540]

The theoretical premises of these experiments are revolutionary, but the practical applications, albeit innovative, were more complex to conceive. It appears evident that the 'congegni' resulting from

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[540] Carlo Argan, 'Arte come ricerca', in *Nova Tendencija 3*, pp. 19-22 (pp. 21-22).

these experiments do not have the same nature as a simple industrial product and do not share its creative process. Argan's words clearly communicate the difficulty in framing an artistic movement capable, above all, of generating a 'theoretical' revolution, but still not easy to be applicable in real life, whose focus is more on the interaction of aesthetics in the creative process. Although a broad discourse on the discordant reaction of critics to this movement has not found space in this thesis, Argan's words serve to clarify the fact that much more can be said and written about this movement.

2. The Heart of the Matter: the Observer. Latest reflections and ideas for subsequent insights

A discussion on the applicability of such experiments cannot fail to consider the observer directly. This idea of a creative aesthetic process is reinforced by scholar Lindsay Caplan who, in her recent article 'From Collective Creation to Creating Collectives: Arte Programmata and the Open Work 1962', regarding the observers, defines the works by Gruppo T and N as a 'material platform that could include them as co-creators of the work'.[541] It is therefore a question of setting the conditions for the creation of a sphere of reception where 'campi di accadimenti' can develop.[542] For Bense, in fact, works of art are the result of a process of aesthetic production. This constant reference to a reality that is, in some respects, abstract can therefore be problematic when it comes to addressing the observer's role.

As already demonstrated, programmed artists – Anceschi explains it well in the introduction to Bense's *Aesthetica* – pursue 'una *scelta* a favore delle istanze della riflessione e contro quelle del sentimento e della emotività'.[543] Although, as demonstrated by the theory of 'correality' itself, the work of art that follows these criteria provides a certain degree of expressive freedom and emotional interaction on the observer, this kind of freedom is limited by the rules imposed by the physical elements and the aesthetic situation programmed by the artist, and from which the observer cannot completely move away. This also seems to be understood by Anceschi who, in the same introduction for Bense's book, writes: 'egli vede bene in prospettiva, egli sente come rischio, le conseguenze di un troppo sofisticato smontaggio – un'attenzione troppo sollecita per essere senza tornaconto – delle strutture individuali e collettive dell'insieme dei riceventi'.[544] The problem that arises and which

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[541] Lindsay Caplan, 'From Collective Creation to Creating Collectives: Arte Programmata and the Open Work 1962', *Grey Room 73*, (2018), 54-81 (p. 57).
[542] See note 477.
[543] Bense, *Estetica*, p. 17.
[544] Ibid.

seems to be hard to be hard to analyse in detail is the observer's reaction to this forced freedom, a problem that I think programmed artists have not taken sufficiently into account.[545]

The hope, following Anceschi's words, was for a 'tensione intellettuale, la modificazione evolutiva necessaria alla ricezione dell'arte sperimentale […] un'azione culturale che richiede uno sforzo'.[546] We are therefore in the presence of a one-way approach that does not involve doubt and an optimistic attitude which 'crede nell'efficacia dell'azione culturale'.[547] This striking dichotomy between apparent and total freedom – which recalls the contrasting nature of Arte Programmata, balanced between programming and chance – could be considered one of the next steps to continue an in-depth study on this topic to better understand and frame the role of the observer. On a theoretical level it is very well clarified, but on a practical level it still leaves many doubts persisting. In this regard, it is worth mentioning again Anceschi, who, with reference to the Bensian model, admits that in Bense's 'correality' 'l'accento è dunque messo sulla prima parte della catena comunicativa – sull'emittente e sul canale – meno sulla seconda parte e cioè sul ricevente, o meglio sull' insieme dei riceventi'. This observation further confirms what has been said so far on the theoretical accuracy (which comes from the artist who sets the programming) of the work of art/observer relationship and on the doubts that arise when approaching the relationship from the point of view of the recipient.

Based on one of the very few videos we have on the exhibitions of Groups T and N, it is possible to make some final observations in relation to what was said above. One video, the aforementioned documentary directed by Monachesi about the first exhibition of Arte Programmata at the Olivetti store in Milan, is analysed by Caplan who makes an observation that deserves attention, and which is a stimulus for hypothetical subsequent studies:

The visitors interact with and marvel at these abstract assemblages and delight in their aleatory movements. On the other hand, the rigid choreography dictated by the works is readily apparent as the people appear to function like the works: their movements, too, are programmed, determined not only by the formal qualities of the work but by the organization of space and by societal conventions and pressure (at one point the film shows people

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[545] When interviewing Mari in 1995, Meneguzzo reported some compelling arguments about the role of movement in the artwork as well as the feedback of the observer on their artistic provocations. When discussing one of his pieces, Mari admitted that: 'la gente non lo vedeva come un esperimento sull'armonia, ma come un bell'oggetto attraente […] Il movimento non era un valore, era qualcosa che ti consentiva di mostrare il processo, uno strumento, che però la gente non capiva'. See *Programmare l'arte: Olivetti e le neoavanguardie cinetiche*, ed. by Marco Meneguzzo, Enrico Morteo, Alberto Saibene, p. 132. This seems to demonstrate how the focus on the ideation process and on the aesthetic value of the work of art, as well as its scientific approach probably weren't fully understood nor appreciated by the public.
[546] Bense, *Estetica*, p. 18.
[547] Ibid.

patiently waiting in line to view Anceschi's Percorsi fluidi orizzontali). […] The audience is included according to carefully delimited terms.[548]

She defines the terms of the problem very well: programming gives birth to a certain kind of observer's expressive freedom which nevertheless has evident limits imposed by the physical context in which the exhibition is organized, by social and behavioral dynamics, and by the very physicality of the objects on display.

This observation could lead to a more in-depth analysis on this movement and on the role played by sensory stimulations, with particular reference to sounds. Although this topic could be extended to several twentieth-century movements and avant-gardes, Arte Programmata can provide interesting food for thought. Indeed, the same sounds hold the potential to favor or limit the observer's participation. During the 1964 Biennale, for example, sounds were the subject of irony by the media. The writer and journalist Renata Pisu, on the pages of *ABC* magazine drew a disparaging profile of the Venetian Biennale to impress the reader with a general sense of anxiety and anguish:

Le sale a loro dedicate sono buie, sembra di entrare nella "casa delle streghe", alle giostre: ti colpiscono strani suoni, cigolii metallici, sospiri di sfiatatoi, rumori penetranti, ossessivi. Le luci si alternano geometricamente su piani traforati; ecco un mostruoso acquario in movimento grazie a un gioco di superfici magnetiche; ecco due cilindri traforati come alveari che girano velocissimi, l'uno accanto all'altro, e fanno un po' di vento […].[549]

These observations on the real involvement of the observer can be added to what has already emerged in the introductory section and throughout the dissertation on the possible indecision on what kind of public engage with the movement's kinetic and aesthetic research. For example, the French G.R.A.V., on some occasions, distributed questionnaires to the public to evaluate the artistic experience just completed. Among the most interesting questions there was certainly 'What in your opinion is the ideal setting for these works?' and among the possible answers to be selected there were for example museums, art galleries, public buildings, social houses. Another particularly effective question was 'What is your state of mind with regard to this exhibition?' with possible answers such as sympathy, indifference, hatred.[550] This kind of material would be very significant and critical to expand the knowledge on the role of the observers and their real understanding of Arte Programmata where the

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[548] Caplan, 'From Collective Creation to Creating Collectives: Arte Programmata and the Open Work 1962', p. 67.

[549] Mariella Milan, *Milioni a colori: Rotocalchi e arti visive in Italia 1960-1964*, pp. 114-115.

[550] *GRAV (Groupe De Recherche d'Art Visuel): Stratégies De Participation, 1960-1968*, ed. by Yves Aupetitallot, Frank Popper, Marion Hohlfeldt, pp. 89-92.

recipient is, theoretically, the real protagonist. This type of research along with a precise analysis on the influence of critics and media (see introductory section) on the taste and opinions of the observer of the period could contribute to the clarification of a role otherwise defined only in an almost speculative way.

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