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Citation for published version:

Patti, E 2021, 'Umberto Eco's *Opera aperta* and the birth of Italian electronic literature', *Modern Languages Open*. <https://doi.org/10.3828/mlo.v0i0.381>

Digital Object Identifier (DOI):

[10.3828/mlo.v0i0.381](https://doi.org/10.3828/mlo.v0i0.381)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Publisher's PDF, also known as Version of record

Published In:

Modern Languages Open

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Umberto Eco's *Opera Aperta* and the Birth of Italian Electronic Literature

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COLLECTION:
DIGITAL MODERN
LANGUAGES SECTION
LAUNCH ISSUE

ARTICLES – DIGITAL
MODERN LANGUAGES



ABSTRACT

The convergence of electronic media and literary forms during the digital revolution has produced a variety of new hybrid genres which we call today 'electronic literature'. In Italy, electronic literature has a rich history. It was born in the cultural milieu of the Neoavanguardia in the early 1960s and, since then, it has produced a significant number of experimental works and practices. In this article, I take into consideration the cultural milieu in which it originated and I examine some of the works of the first Italian "electronic" writer, Nanni Balestrini. I will first contextualise Umberto Eco's *Opera aperta* in its cultural context, with a special focus on some of the foundational concepts of the "open work" (crisis, interactivity, entropy). In section 3, I argue that *Opera aperta* does not only coincide with the birth of the first Italian electronic literary work, namely Nanni Balestrini's *Tape Mark I*, but it also provides a theoretical and methodological framework to analyse Italian electronic literature across decades from both an aesthetic and critical perspective. In my analysis of some of Balestrini's key works and collaborations in electronic literature in the following section, I emphasise how formal experimentation and political intention are strictly intertwined and critically address some important questions about our relationship with technologies, such as automation and alienation. Finally, in the conclusion, I highlight the points that make the modern concept of '*opera aperta*' an effective methodological tool for exploring the 'open textuality' of electronic literature and how artists have come to terms with the new forms of expression offered by new media.

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TO CITE THIS ARTICLE:

Patti, E 2021 Umberto Eco's
Opera Aperta and the Birth of
Italian Electronic Literature.
Modern Languages Open,
2021(1): 20 pp. 1–13. DOI:
<https://doi.org/10.3828/mlo.v0i0.381>

The convergence of electronic media and literary forms during the digital revolution has produced a variety of hybrid genres which in the present day are often labelled as “electronic literature”. As Massimo Riva points out in *Il futuro della letteratura. L’opera d’arte nell’epoca della sua riproducibilità digitale* (2011), electronic literature encompasses not just reading and writing practices, but all of the senses and artistic media, such as poetic and narrative movement, full bodily interaction with a written text, dance, painting, sculpture, design, which are all integrated into something that we still label “literary” (27). More specifically, he notes how, when it is remediated by a computer, the text of a story or a poem turns into a complex layered palimpsest made of “natural” and algorithmic language, words and alphanumeric codes, which both machines and human beings can read in a new form of collaboration between artificial and human intelligence. In order to represent the inherent resistance of these practices to the “law of genre” (Derrida 56), the actual definition provided by the Electronic Literature Organisation in 2004 accommodates such flexibility: “electronic literature” refers to “works with an important literary aspect that takes advantage of the capabilities and contexts provided by the stand-alone or networked computer”. In keeping with Todorov’s definition of “a new genre”—that is, “the transformation of one or several old genres: by inversion, by displacement, by combination” (cited in Swales 46)—and Rick Altman’s theory that new genres are born of the marriage between a pre-existing form and a new technology, “electronic literature” is inevitably marked by hybridity and, perhaps, by monstrosity, as suggested by Katherine N. Hayles (4).

In Italy, electronic literature has a rich history. It was born in the cultural milieu of the *Neoavanguardia* in the early 1960s and, since then, it has produced a significant number of experimental works and practices which can be generally grouped as follows:¹ ‘combinatory literature’, ‘kinetic and interactive poetry’, ‘hypertext fiction’, and ‘network writing’. Under these umbrella categories, a number of genres have emerged, including Nanni Balestrini’s computer poetry, Gianni Toti’s video poetry, Luigi Longo, Luisa Lux and Fabrizio Venerandi’s kinetic poetry, Caterina Davinio’s net-poetry, Enrico Colombini’s interactive fiction, and the various forms of network writing by Wu Ming (distributed narratives), Kai Zen (hypertext novel), Michela Murgia and Francesco Pecoraro (blooks), Tommaso Pincio (social network novel), and Scrittura Industriale Collettiva (wiki novel), to mention just a few. These hybrid genres tend to be multimodal and mostly employ, as well as question, technological processes such as coding, networking, hypertextuality, interactivity, virtuality, and simulation. In spite of the richness and international significance of Italian electronic literature, a systematic reconstruction of its historical phases, along with its milestones, protagonists, key genres, and the critical issues they raised, has not yet been undertaken globally.² Similarly, the social, political, ideological, moral, linguistic, and educational functions of electronic literature have barely received any attention.

In the limited space of this article, I of course cannot provide a full reconstruction of the history of Italian electronic literature from 1961 to the present day, but I will introduce the cultural milieu in which it originated and examine some of the works of the first Italian “electronic” writer, Nanni Balestrini. I will first contextualize Umberto Eco’s *Opera aperta* in its cultural context, with a special focus on some of the foundational concepts of the “open work” (crisis, interactivity, entropy). Eco played a crucial role in neo-avant-garde artistic theory and experimentation which boomed in Italy in the 1960s and 1970s. In *Opera aperta* especially, the Italian semiotician reflects on a number of artistic questions that lie at the intersection of different social and technological theories, such as cybernetics, system theory, pragmatism, and Marxism. These include the relationship between author and audiences, the convergence

1 It is worth remembering that a radical renewal of literary language, challenging the values of consumerist and mass-media society was at the core of the Italian *Neoavanguardia* and the literary movement Gruppo 63, including Elio Pagliarani, Antonio Porta, Luciano Anceschi, Umberto Eco, Giorgio Manganelli, Renato Barilli, and Balestrini. In this group, Balestrini was the poet who most radically experimented with the materiality of the verbal sign and the cut-up technique—Andrea Cortellessa effectively defined him as a “implacabile remixatore”. Crucially, Balestrini acted as a bridge between the Gruppo 63, which aimed at destroying the conventional literary institutions without abandoning the linguistic medium, and other groups which shared the desire to overcome the limits of poetry as a strictly verbal form of communication, transforming it through iconographic and figurative compositions of numerous kinds.

2 See Patti (forthcoming) for a comprehensive reconstruction of Italian electronic literature from Eco to the present day.

between arts and technologies, and how artistic experimentation can address Marxist questions about society. In section 3, I argue that *Opera aperta* not only coincides with the birth of the first Italian electronic literary work, namely Nanni Balestrini's *Tape Mark I*, but also provides a theoretical and methodological framework to analyse Italian electronic literature across decades from both an aesthetic and critical perspective. In my analysis of some of Balestrini's key works and collaborations in electronic literature in the following section, I emphasize how formal experimentation and political intention are strictly intertwined and critically address some important questions about our relationship with technologies, such as automation and alienation. Finally, in the conclusion, I highlight the points that make the modern concept of 'opera aperta' an effective methodological tool for exploring the 'open textuality' of electronic literature and how artists have come to terms with the novel forms of expression offered by new media.

2. UMBERTO ECO'S *OPERA APERTA*: CRISIS, INTERACTIVITY, ENTROPY

Eco's *Opera aperta* (1962) was published at a time when social, economic, and technological transformation was disrupting the face and identity of postwar Italy. The industrial growth that accompanied the 'economic miracle' (1958–1963) was at its peak; at the same time, there was massive social agitation across the country. Mass media and neocapitalism created the first real linguistic and cultural unification of Italy, yet they also had an unprecedented standardizing effect on the rich diversity of dialects, local cultures, and traditions. The new circuit of powerful mass media included television, cinema, and press, but increasingly also emerging information technologies. Artists, along with cultural theorists, had to rethink forms of expression and critique in order to respond to this new wave of modernity that brought excitement and creative opportunities but also a sense of chaos, as well as the crisis of traditional values and points of reference. Within this context, Eco's *Opera aperta* reflected on how to reconcile the new forms of expression offered by emerging technologies, the contribution of various new theories (such as cybernetics, systems theory, and pragmatism), and a Marxist worldview.

Eco's overall assumption is that art reflects the culture of its time. Thus, whereas in the past a rationalist view of an ordered cosmos tended to inform the idea of 'closed works', in the twentieth century the sense of chaos, indeterminacy, probability, ambiguity, discontinuity, and polyvalence introduced by modern scientific knowledge had led to a crisis in the rational order of the world, making us reconsider both present and past artistic and literary production as 'open works'. With this in mind, *Opera aperta* explores the phenomenology of 'open poetics' throughout cultural history, by presenting a range of examples where artists and writers challenged, in different ways and cultural eras (e.g. the Middle Ages, Baroque, Romanticism, Modernity), the closed order of artistic forms (e.g. literature, musical pieces, visual arts): medieval texts, through the open meaning of allegory; Baroque forms, through their dynamic indeterminate form; Romantic texts, through their evocative power and uncertain meaning; and contemporary works, with their semantic ambiguity, are all 'open works'. Essentially, Eco suggests that 'open work' is an epistemological metaphor that reflects how science and culture, as forms of knowledge, have informed the interpretation of signs, as well as the role of readers and audiences across centuries.

Two definitions of 'open work' seem to emerge in Eco's text. First, an 'open work' is any work that is not framed, delimited, or self-contained by its own structures. Open works suggest that the meaning, the narrative, and the space go beyond the work's conceptual or physical 'edges', reaching out to our world. The stability and balance of closed forms—created, for example, by symmetrical and self-contained arrangements in Renaissance art—are replaced by movement and momentary effects. Open works are dynamic rather than static. However, this does not mean that they are unfinished. At the same time, a 'finished work' (*opera conclusa*) can still be considered 'open' because of the continuous germination of internal relationships of meaning discovered by users in the act of interpretation. For instance, the Christian Scriptures can be read at literal, allegorical, moral, and anagogic (i.e. spiritual) levels. Second, an 'open work' could be a work of art that is intentionally left 'open' to co-creation. In this case, the collaboration of another agent/agency is not only expected but actually '*programmato*' [programmed into the works]. Examples of open work in this second category are diverse and involve different

arts, media, and forms of *programmazione* [programming]. One of the examples Eco uses is Bertolt Brecht's theatre. Typically, Brecht's drama revolves around ambiguity and does not provide solutions to social existence; it is up to the audience to draw their own conclusions. In this case, openness serves as a tool to enact revolutionary and reflective pedagogy. Yet 'open work' could also imply physical and material involvement. Eco describes this category as 'works in movement', especially in relation to plastic arts, where natural or induced movement can produce different effects. Alexander Calder's *Mobiles (Mariposa)* (1960), for instance, are basic structures that can move in the air and assume different spatial positions and dimensions. When it comes to programming, 'open work' can imply various forms of co-agency, from the scientific calculation of possible interactions between the work of art and audiences, to coding specific forms of interactivity between the author, the machine, and the users. These forms clearly depend on the intentions of the authors, but they also have a wide margin for unpredictability, given that the agency is shared with machines and other users.

Interactivity thus played a crucial role in both definitions of 'open work'. This was often interpreted as an open system of interactions, be they conceptual or material. The emergence and influence of systems theory, artificial intelligence, and cybernetics,³ on the one hand, and human sciences based on relativism, pragmatism, and conventionalism, on the other, certainly had a significant influence on this concept. As Edward Shanken writes, "the wired, electronic outlines of a cybernetic society became apparent to the visual imagination" (Shanken 2015: 12), penetrating arts and culture, as well as science and engineering.⁴ Systems theory and cybernetics, with their focus on the interrelatedness and interdependence of parts, suggested a reinterpretation of the work of art as a dynamic, open-ended, and responsive process of interaction between its constitutive parts. Relativism, as the rejection of universal, absolute, objective truths, suggested the potential limitlessness of interpretations. Conventionalism, on the other hand, with its belief that principles are grounded in (implicit or explicit) social agreements, stressed how cultural dynamics and forms of agency are part of a social system and, to some extent, can be predicted, shared, or contested. Pragmatism, which considers the knowledge of the world to be inseparable from the agency within the world itself, encouraged the making and interpreting of literature, and other arts, in collaboration with the sciences, as well as physical experimentation in the process of artistic creation.

Another significant concept discussed in *Opera aperta* is 'entropy', that is, the amount of disorder in communication, as well as in art, and how this relates to intermedia experimentation and collaboration with other agents. In a nutshell, Eco argued that extraneous inputs in art, whether these are introduced via disorder, uncertainty, or unpredictable variants through the encounter

3 Cybernetics was a discipline that was first theorized by Norman Wiener in 1948. In his key text *Cybernetics, or Control and Communication in the Animal and the Machine*, Wiener defined it as "the scientific study of control and communication in the animal and the machine" through an interdisciplinary approach involving biology, mathematics, engineering, and social sciences. Cybernetics was based on the concept of an 'open system' or a 'system of forces'; in other words, it focused on interconnections and relationships between the system and the environment (whether this is made of machines or living beings), as well as the notions of information, network, and code. In Italy, cybernetics gained a following in the early 1950s. Between 1952 and 1954, Enzo Cambi and Anna Cuzzer founded the first Italian Cybernetics Centre (*Centro Italiano di Cibernetica*) in Rome. Among its members were the computer scientist Corrado Böhm, the mathematician Bruno De Finetti, the engineer Giorgio Sacerdoti, and the physics and science philosopher Vittorio Somenzi. The establishment of the *Centro Italiano di Cibernetica* was followed by the opening of other cybernetics centres: one in Milan that specialized in linguistics, directed by Silvio Ceccato and Enrico Maretti, one in Naples that specialized in neurophysics, directed by Edoardo Caianello and Valentino Braitenberg, and one in Genoa that specialized in biophysics, directed by Antonio Borsellino and Augusto Gamba. The jurist, musician, and philosopher Silvio Ceccato (1914–1997) played key role in the artistic field: he popularized cybernetics through his expository newspaper articles in *Il Giorno*, later collected in the volumes *Cibernetica per tutti* (1968–1974), translated a number of important texts, and made a great contribution to computational systems of automatic translation and artificial intelligence (Antonello 2013: 172–6). The Cybernetics Centre he directed in Milan gave rise to one of the most notable research groups in cybernetics, the Rimini-based artists named Gruppo V ('Vision'), or Gruppo di ricerca cibernetica (after 1968), who were active between 1959 and 1967 and played a significant role in overcoming the dualistic perspective that opposed science/technology and philosophy, as well as mind and body. See Roberto Cordeschi, "La cibernetica in Italia", in A. Clericuzio and S. Ricci (eds), *Il contributo italiano alla storia del pensiero* (Rome: Scienze, Istituto della Enciclopedia Italiana), pp. 563–70.

4 By drawing upon a work published at the same time as *Opera aperta*, Thomas Kuhn's *The Structure of Scientific Revolutions* (1962), Jack Burnham noticed that science, in any given period, is usually dominated by a single 'major paradigm', that is, a pervasive and intellectually powerful conception that dominates all scientific discovery. In his time, Burnham contends, "the emerging major paradigm in art is neither an *ism* nor a collection of styles" (115). It is not a novel way of rearranging surfaces and spaces, but it is "fundamentally concerned with the implementation of the art impulse in an advanced technological society" (ibid.). He goes on to state that "we are now in transition from an object-oriented to a system-oriented culture. Here change emanates not from things but from the way things are done" (ibid.).

with other arts, media, or agents, significantly add to its meaning. This idea resonates with McLuhan's postmodern theory of the 'hybrid', as discussed in a chapter of his *Understanding Media* (1964) titled "Hybrid Energy: Les liaisons dangereuses".

The hybrid or the meeting of two media is a moment of truth and revelation from which new form is born. For the parallel between two media holds us on the frontiers between forms that snap us out of the Narcissus-narcosis. The moment of the meeting of media is a moment of freedom and release from the ordinary trance and numbness imposed by them on our senses. (McLuhan 1964: 55)

We also find this theory in Dick Higgins's notion of 'intermedia' and Gene Youngblood's 'expanded cinema'. The intermedia hybrid gives rise to new discursive and communicative forms, which spread in the media universe, reconfiguring relationships and perceptive modalities. *Opera aperta* was, however, published before McLuhan's *Understanding Media* (1964), which was translated and published in Italy in 1967. We can therefore presume that the connection between 'entropy', intermedia hybrids, and collaboration with other agents, as explored by Eco in *Opera aperta*, was possibly inspired by Mikhail Bakhtin's notion of 'hybridization', and Claude Shannon's information theory, popularized in a paper entitled "A Mathematical Theory of Communication" (1948), and Norman Wiener's *The Human Use of Human Beings* (1950). Shannon defined entropy as the amount of uncertainty in the value of a random variable. The higher the level of uncertainty, the greater the amount of information. In other words, when a message is very predictable, we do not get much information from it. From this perspective, information is the unpredictable, uncertain element, the disorder that destabilizes the order, the closed form, the monological system. In this respect, hybridity is the ideal outcome of 'entropy'. According to Bakhtin, hybridization is a dynamic ongoing process that entails the combination of two languages and undermines the notion of a monological authoritative discourse through polyphony, dialogism, and heteroglossia. Bakhtin's notion of hybridization was mainly applied to literature and verbal language, but the underlying principle is similar to McLuhan's 'intermedia hybrids'.

By transposing information theory into the arts, in the chapter "Apertura, informazione, comunicazione" [Openness, information, communication], Eco explains that 'meaning' arises from the predictable codified relationship between linguistic structures and the signified, while 'information' is the result of an improbable sign, namely entropy, within the order of that conventional system. Poetry, for example, results from the original association of words, sounds, and concepts, which serves to communicate a new emotion. It can be seen as a form of 'disordine' [disorder], and thus a form of 'entropy', in the context of the conventional system of language that provides 'information'—if we find the term 'informazione' repulsive in a poetic context, Eco adds, then we can call it '*significato poetico*' [poetic meaning]. If languages are typical branch systems based on a series of probabilities, and thus communication codes, meaning should transcend communication by being improbable and therefore original.

The concept of entropy is particularly important when it comes to intermedia hybrids, such as those works developed at the intersection between different arts and media. It is vital that the disorder that emerges from the originality created on the basis of the conventional system of communication is somehow dominated, controlled. Simply put, we have to find a balance between the form and its opening to the possibility of multiple meanings. If this balance is not attained, the result is incommunicability.⁵ More precisely, open works, as Eco himself suggests, are inevitably situated, and oscillate, between the poles of order and process, structures, and experimentation, leading to 'opening' and the creation of a new form. From this perspective, Eco identifies two types of 'opening'. On the one hand, in *apertura di primo grado*, opening is conceived as the ongoing process of the interpretation of works that are unambiguous, for instance Dante's *Commedia*. *Apertura di secondo grado*, on the other hand, it is typical of avant-garde movements and focuses on the process of experimentation, creative transformation,

⁵ In the second edition, Eco added a note, titled '*Postilla 1966*', to clarify more specifically why information theory, mainly applied to the transmission of information in bits, is relevant in human communication—and to what extent it lays the foundation for a theory of communication.

and transition, as I discuss in the next section.⁶ In this case, works remain intentionally open to other agents' interventions, as, for example, in James Joyce's *Finnegans Wake*.

3. UMBERTO ECO'S *OPERA APERTA* AND THE BIRTH OF ELECTRONIC LITERATURE

Opera aperta does not mention any work of Italian electronic literature, but there are valid reasons why it should be considered as its foundational theoretical text. To start with, its publication coincided with a related milestone event which marks the early days of Italian electronic literature, namely the publication of the special issue of the *Almanacco letterario Bompiani 1962*, titled *Grafiche programmate con criteri cibernetici*, edited by Eco and Bruno Munari, which revolved around the question of how to apply electronic computers and programming to the moral sciences and literature. The volume included, among others, Nanni Balestrini's computer poem *Tape Mark I* (1961) which used an IBM 7070 to experiment with automatized permutation in poetry. Balestrini's computer poetry can be considered as the first Italian work of electronic literature.

Second, the shift of focus from the 'authorial function' to an 'author-machine' and 'author-audience collaboration' function, which Eco discusses in this essay, laid the foundation for a theory of interactivity. Massimo Riva aptly pointed out how Eco's theory of 'open work' essentially theorized that creative space of 'reading-writing', which we can experience both in the book and in programmable media as *wreading* (as formulated by Landow). In electronic literature, this area of interaction between authors and other agencies is much more extensive than in print literature: narratives and forms can be manipulated (through permutation, comments, fan fiction, transposition, etc.) or programmatically thought of as a co-creation of the text. The idea of co-agency is central not only when we examine collaborative creativity in human interaction, but especially, in the case of electronic literature, when our object of study is collaborative creativity in human-machine interaction. In that case, the input given by the 'other' agent can be programmed, but only to some extent. We never fully know what outcome the audience's interaction with a given text can be, even when we decide its general rules and set some constraints. The 'random variable', namely the informative element, the surprise, the unexpected, the uncertainty, the transcendence of the barriers of causality and conscious volition, or the "magical chance" (Richter 57) as defined by the Dada movement, is a common feature in electronic literature.

Third, the work of art is conceived as an open system of interactions. Since the 1960s, there has never been a single interpretation of 'system'; in fact, this culturally loaded concept has been embedded in the ideological interplay between technologies and societies in a variety of ways. For example, in line with his religious beliefs, Nam June Paik and similar artists supported the idea that all things are interdependent and closely connected to each other; from this perspective, technology is not in conflict with nature but an extension of the human realm. A number of other theorists, including philosophers, literary critics, and sociologists, have interpreted cultural systems as sites of class struggles, aesthetic frictions, or problematic complexities—see, for instance, Gilles Deleuze's rhizome and 'machinic phylum' theory, Pierre Bourdieu's field theory, Heinz von Foerster's second cybernetics theory, Bruno Latour's actor-network theory, Nicolas Bourriaud's relational aesthetics and the more recent complexity theory. Last but not least, the 'open work' as a system of interactions strongly resonates with the more recent concepts of 'convergence' (Henry Jenkins) and 'intermediality' (Werner Wolf, Gabriele Rippl). A text, which is open to different interventions and integrations, is also exposed to intermedia hybridization and transposition from one artistic medium to another, regardless of the author's intention. In addition, it can be enacted or performed using different technologies that will inevitably affect the audience's experience—see transmedia storytelling, for example. In electronic literature, the text quality of 'being open' means being open to different transpositions, recombinations, fusions of different artistic texts, and, ultimately, to endless remediations.

⁶ In the field of 'electronic literature', forms of openness, structure, and experimentation are all inherent characteristics. Blogs are a typical example of how fiction and non-fiction writing have transformed, in digital media, into a new mainstream narrative form. Like novels, they help us understand how they "represent a kind of understanding of the individuals represented and the society in which they are a part; or to represent imagined possibilities" (Wilson 2010: 46). Net-poetry, on the other hand, is one of the experimental practices that found their natural environment in the experimental venue of the Venice Biennale.

Fourth, by exploring how ‘open textuality’ could be reconciled with Marxist critique, Eco’s text offers a model to analyse electronic literature from a critical perspective. *Opera aperta* was written at a time when left-wing intellectuals and artists were rethinking how to use art for political purposes after the ideological crisis that followed the Hungarian revolution and the blow to the Soviet Union’s credibility in 1956. In one of the key essays of the collection, titled “Del modo di formare come impegno sulla realtà” [*On the manner of forming as a commitment to reality*], Eco stresses the importance of rethinking the critical approach to reality and political action in art (the so-called *impegno*). It was undeniable that society had dramatically changed and capitalism had impacted on our existence and its vital processes through its emergent ‘superstructures’, namely mass media and new technologies. In Eco’s view, the *trans-formative*, critical, and countercultural power of art had thus to be rethought, by operating a similar shift. In other words, it had to go beyond the socialist ideological imperative of mimetic representation, which had characterized *impegno* in postwar Italian literature, and had to be enacted through our ‘*modo di formare*’—a critical approach to the material forms and processes of cultural communication. In the wave of the debates developed in the circles of the ‘New Left’ and the Frankfurt School in the same years, the assumption was that capitalist-owned mass media come together with alienation, social inequality, cultural hegemony, and related issues. Eco’s call for *impegno* is thus a call for a reappropriation of a Marxist political agenda, which at the same time highlights that artistic practice cannot be separated from a critical response to the superstructures of capitalism.

In Marxist theory, alienation is the process by which humans and society are separated from their authentic needs, their vital processes and objects, causing a sense of estrangement and psychological dissociation (namely, alienation).⁷ Alienation can be overcome through the recognition of our loss and the reappropriation of such needs, vital processes, and objects. In relation to the working class, alienation manifested in the proletariat’s loss of control over the means of production, which were controlled by elites. Philosophers and thinkers of later generations have, however, reinterpreted this notion in the broadest context of modern and contemporary societies and their problems. In the 1940s, Theodor Adorno and Max Horkheimer, for example, established how a similar dialectics had been transferred to the cultural industry and mass media communication dominated by a logic of commodification of both our material life and human consciousness. In their view, people had not only lost control of their means of production but also of their imagination. The phenomenon was mainly observed in broadcast media; yet, to a number of intellectuals, such as Balestrini, who were particularly concerned with the reification and alienation of language, it did not go unnoticed how other capitalist imperatives, such as efficiency and automation, were more subtly pervading emergent information technologies like computer machines. For Balestrini, the rationalization of production processes raised questions not only at ‘base’ level—for example how they were threatening and potentially destroying the working class by de-industrialization—but also at a ‘superstructural’ level, in terms of how the logics of Fordism were colonizing our language, thinking, and social dynamics. It does not come as a surprise, given the close collaboration between the two, that Balestrini responded to Eco’s call, becoming an undeniable pioneer in electronic literature worldwide. As I examine in more detail in the next section, the computer machine was at the same time an ally to provoke and disrupt language (*Tape Mark I*), and a tool to explore the affordances and limits of the work of art in the age of mechanical reproduction (*Tristano*), as well as those of networks (*Épreuves d’écritures*).

4. BALESTRINI’S CRITICAL RESPONSE TO ALIENATION AND AUTOMATION

From its very beginning, Balestrini’s work stands out for its challenge to what he calls “the inertia of language” (*l’inerzia del linguaggio*) (Balestrini 398), namely the alienating effect, or semantic void, produced by the reification and commercialization of mass media language. In his short essay “Linguaggio e opposizione” (1960) [*Language and Opposition*] written one

⁷ According to the Marxist theorist György Lukács, reification happens when “objectified forms in society bring the essence of man into conflict with his existence”, for instance when their nature is “subjugated, deformed and crippled” (Lukács 1971, xxiv). The concept of ‘inner essence’ as a transcendental value of humanity has, understandably, been questioned by a number of Marxist theorists in the last few decades. Also see Jonathan Wolff, *Why Read Marx Today?* (Oxford: OUP, 2003).

year before *Tape Mark I*, he claims that poetry should react to dogmatic and conformist language—“il linguaggio anemizzato e amorfo delle quotidiane conversazioni” [the anaemic-made and dreary language of everyday conversations]—by “teasing” and “ambushing” words (“stuzzicare” *le parole, il tendere loro un agguato mentre si allacciano in periodi*) (Balestrini 398). By being ambiguous and absurd, ‘open’ to a plurality of signified(s) and alien to conclusions, poetry should thus reveal the elusive and fickle side of life (399). Such an opposition to standardized language was pursued through the disruption of syntax (*asintattismo*) and the reuse of existing materials, finding its most emblematic expression in the cut-and-paste technique of his later *collages* and *découpages*, as well as in the ‘ex machina’ poetry, namely the programmed reassembling of linguistic units in his poetic experiments with the computer. Some critics noted that “in a world in which the capitalist structure has reduced language to commodity and exchange value, Balestrini finds it mystifying and self-defeating to search for any form of poetry as an authentic expression of the ‘I’” (Picchione 148). The bottom line is, Barilli contends, that the anonymous collective production of industrial objects, when it comes to visual arts, or of stereotypes, slogans, ready-made phrases, when it comes to literature, is so abundant and, in its own way, creative, that it literally exhausts artists and poets (Barilli 2005: 68). In this perspective, the poet’s task is not to produce yet again another series of words and images, but to cut, reassemble, extract, produce estrangement, or even ‘evisceration’ [*sventramento*] (Lorenzini and Colangelo 220–22) in language, in order to free new meaning, as I illustrate below.

COMPUTER POETRY: TAPE MARK I (1961)

Published in the 1962 special issue of the *Almanacco Bompiani* dedicated to the application of computers to the moral sciences and literature, *Tape Mark I* was based on the programmed recombination of linguistic units (called ‘sintagmi’, syntagms) taken from three literary texts: *Diario di Michima* by Michilito Hachiya (“l’accecante globo di fuoco si espande rapidamente trenta volte più luminoso del sole quando raggiunge la stratosfera la sommità della nuvola assume la ben nota forma di fungo” [the blinding fireball expands rapidly thirty times brighter than the sun when it reaches the stratosphere takes on the well-known mushroom shape]); *Il mistero dell’ascensore* by Paul Goldwin (“La testa premuta sulla spalla i capelli tra le labbra giacquero immobili senza parlare finché non mosse le dita lentamente cercando di afferrare” [Head pressed on shoulder thirty times hair between lips lay motionless without speaking until he moves his fingers endeavouring to grasp]); *Tao te King* by Laotse (“mentre la moltitudine delle cose accade io contemplo il loro ritorno malgrado che le cose fioriscano esse tornano tutte alla loro radice” [while the multitude of things comes into being I envisage their return, although things flourish they all return to their roots]). Drawing upon a long tradition of artists and writers experimenting with disassembling pre-existing material and reassembling it (such as Mallarmé, Raymond Roussel, Arp, Joyce, Pound, Ungaretti, Leiris, Queneau, Burroughs, Corso, Klee, Dubuffet), *Tape Mark I* is the result of the combinatory process of linguistic units performed by an IBM 7070 at the Centro elettronico della Cassa di Risparmio delle Province Lombarde in Milan in October 1961.

The poem was created following the typical procedure of generative literature, that is, an algorithmically generated genre of literature in which the code (algorithm) performs a permutation of base linguistic units, word lists, syllables, or pre-existing texts that results in a new form.⁸ The original set of base words or texts is rearranged in a new sequence of words, or signs and symbols, according to the programming code. As a typical intermedia genre, generative literature blends the language of programming (algorithms) with the base verbal language (a series of verbal units named ‘syntagma’). The significance of these literary experiments arises from the interplay between the instructions given by the author/programmer to the computer in the form of code and the margin of randomness. The sense of ambiguity, indeterminacy, discontinuity, and polyvalence that results from the relationship between programming and randomness defines the poetics of such ‘open works’. At the same time, authorship is creatively shared by humans and the artificial intelligence of machines, with the aim of altering or subverting typical forms of expression and/or questioning the

8 We can identify three types of text-generation: permutational (recombining elements into new words or variations), combinatoric (using limited, preset word lists in controlled or random combinations), or slotted into syntactic templates (also combinatoric but within grammatical frames to create an image of ‘sense’).

human relationship with language. Generative literature can indeed be used, in conjunction with the cut-up technique, to critically disrupt conventional representations. Rearranging texts or sequences of words means, in this context, disrupting language, images, sounds, and audiovisual materials and re-presenting them in alternative ways. The indeterminacy of these texts, the multiplicity of possible interpretations, is enhanced by the machine's authorial co-gency and calls on the reader to play an even more active role.

In *Tape Mark 1*, each linguistic unit was marked by a code at its beginning and its end, indicating the possible syntactic connections between two subsequent elements. The computer output consisted of creating six stanzas of six verses each composed of four metrical units per line. The instructions included in the preface further explain that the computer was expected to create combinations of ten elements out of the fifteen units provided, with no permutations or repetitions. These combinations were then supposed to be divided into six verses including four metrical units each. In the end, minor editorial changes to grammar and punctuation were made in the final text. Here is the first stanza:

La testa premuta sulla spalla, trenta volte
 più luminoso del sole, io contemplo il loro ritorno
 finché non mosse le dita lentamente e, mentre la moltitudine
 delle cose accade, alla sommità della nuvola
 esse tornano tutte, alla loro radice, e assumono
 la ben nota forma di fungo, cercando di afferrare.

[Head pressed on shoulder thirty times
 brighter than the sun I envisage this return
 until he moved his fingers slowly and while the multitude
 of things come into being at the summit of the cloud
 they all return to their roots and take on
 the well-known mushroom shape trying to grasp]

The theme of nuclear disaster is still strongly evoked through the inclusion of Hachiya's syntagmatic units—'l'accecente/ globo/ di fuoco', 'si espandono/ rapidamente', trenta volte/ più luminoso/ del sole', 'quando raggiunge/ la stratosfera', 'la sommità/ della nuvole', 'assumono/ la ben nota forma/ di fungo'—which make the text elegantly cohere around these powerful images of the devastating "mushroom shape" explosion. It is undeniable that computers can offer creative trampolines, variational exploration machines that engender trajectories from which the poet can select possible paths. This experiment also clearly delineates the eerie capacity of the human mind to impose order, pattern, and meaning onto mangled heaps of language. In this respect, Funkhouser has rightly pointed out that "the use of set phrases in these poems ('hair between lips' or 'well-known mushroom shape') gives a renga-like quality when more than one is presented at a time" (Funkhouser 2007: 42). However, equally strong is the inevitable nonsense and disruption effect accompanying this nuclear scenario (Loreto 100–01), effectively conveyed by the mechanistic tangent of incoherent lines. As the critic Alfredo Giuliani highlighted, any narrative development is nullified and an agonizing multitude of uncontrollable actions and immeasurable events are fixed within an apparently classical composition (Giuliani 148). In a nutshell, the way Balestrini used computer technologies in *Tape Mark I* is therefore functional and fully in line with the poetics he was developing in printed poetry. The random combination of words and images was intended to both generate awareness towards conventional language, now that its disruption had made its conventionality more visible, and to reveal the unexpected forces and properties of languages. In sum, as Picchione put it, "the deliberate disorder of the poems, their programmed entropy, is born out of the conviction that the higher the degree of uncertainty, ambiguity, or improbability of a message, the higher the degree of information produced" (155).

GENERATIVE LITERATURE: BALESTRINI'S *TRISTANO* (1966 AND 2007)

The topic of the work of art in the age of mechanical, and digital, reproduction is raised in *Tristano*, a sentimental experimental novel based on the classical French story of adulterous lovers Tristan and Isolde. The novel was published by Feltrinelli in 1966 in only one of the potential versions that Balestrini had conceived for it, but was fully realized by Derive e

Approdi in 2007, thanks to digital printing technologies. The original idea was in fact to produce a *'romanzo multiplo'* [multiple novel], namely as many versions of the story as there would be printed copies, so that each one could present a unique sequence of sentences and, therefore, a unique narrative. The 2007 edition is introduced by Umberto Eco's preface "Quante ne combina Balestrini", which uses the pun *'combina'* to indicate, at the same time, the combinatory matrix of the novel and the idiomatic expression 'to be up to all sorts of mischief'. Eco suggested different reading options for such a novel: reading a single copy and treating it as "unique, unrepeatably and unchangeable"; "considering it to be the best [...] possible" version; or reading several and comparing the outcomes (Jacques 2014).⁹ These are a number of interpretations of *Tristano* which, to my knowledge, Balestrini has neither confirmed nor rejected. Undoubtedly, co-authorship/co-agency is enacted between Balestrini and the programmers of the algorithms, but equally important is the co-production of meaning shared with readers through the interpretation and the effort they must make to produce sense from what appear to be, in places, illogical sequences of words. On a critical level, Balestrini's strong ideological commitment—the years 1960–1977 are well documented in *L'orda d'oro* (1988), written with Primo Moroni, for example—and the rebellion against the principle of authority and domination suggest a twofold strategy. Unlike *Tape Mark I*, in *Tristano* Balestrini did not only want to disrupt the linguistic 'system' with the collaboration of a computer, in order to 'open' it up to multiple possibilities of meaning which readers could co-create with the author. He also somehow disrupted the logics of the publishing 'system', by challenging the mechanical, and later digital, reproduction of literary works. Paradoxically, the potential multiplicity of the novel results in fact in the diminished value of the original and the uniqueness of each of its 'copies'. This operation was certainly in line with a profound belief in the self-determination of subjectivity. Whether this experiment aimed at the restoration of a sort of 'inverted *aura*' for the literary work—and by 'inverted *aura*' I mean the unique aesthetic authority of each copy, in this case produced by the collaboration between author and reader who buys a single randomly generated version of the book—is a reasonable question to raise, although only partially relevant for printed literature. To some extent, every book manifests its unique presence in time and space in the process of reading, as individuals activate their own process of meaning-construction in collaboration with the author. Still, in terms of market value, one could argue that each copy of *Tristano* is an original and the machine that produces the book-object contributes to a dynamic collaboration of technologies, authors, and readers.

COMBINATORY EXPERIMENTS: BALESTRINI'S *ÉPREUVES D'ÉCRITURES* (1985)

The material condition of technology is at the core of another interesting collaboration that Balestrini developed with Thierry Chaput, director of the Centre de Création industrielle (CCI) and the French philosopher Jean-François Lyotard who organized the exhibition *Les Immatériaux* at the Centre Pompidou a few years later (1985). At the time, Lyotard had just published *The Postmodern Condition* (1979) which revolved around the post-industrial condition of society and culture, with a special focus on the condition of knowledge following the immateriality of goods and what he called 'the hegemony of computers'. Such a condition, Lyotard argues, undermines the relationship between the knowing subject and the known object which had been an epistemological point of reference for centuries. In *The Postmodern Condition*, Lyotard's leading concept is that along with the 'hegemony of computers' comes a particular 'logic'. Not only will computers establish a certain set of prescriptions determining "which statements are accepted as 'knowledge' statements" (4); but, even worse, in Lyotard's view, it will transform knowledge into an informational commodity to be produced and consumed. In other words, it will transform it into a value to be exchanged.

The exhibition placed emphasis on the immateriality of the body, chemistry, energy, light, market exchanges, and especially on the digital as the turning point of communication practices (Gallo 18). In one of the sites of the exhibition, named *Labyrinthe du langage*, each contributor was invited to reflect on fifty words related to the theme of the 'immaterials'. Contributors, including writers, scientists, linguists, philosophers, and artists, were asked to give brief definitions of fifteen or twenty of these words using some Olivetti M20 micro-computers. These definitions were then memorized on a M24 machine and shared with the other authors in a sort of network.

9 <https://www.newstatesman.com/culture/2014/02/nanni-balestrinis-tristano-love-story-100-trillion-possible-plotlines>.

At any point in the exhibition, authors could contest, discuss, or comment on definitions given by the other contributors, thus making this network of texts critical and interactive. The purpose was not to create a dictionary, which they defined as ‘a musée de consensus’, but to emphasize the semantic differences generated by one single word (Lyotard and Chaput 6). More specifically, authors were encouraged to create some sort of connection with the definitions given by others and themselves, and to reflect on the process of writing in this situation.

Balestrini’s experiment consisted of twenty-four two-line definitions of words, such as code, writing, language, which were assembled through a combinatory poetics. Each definition was composed of four nouns combined through the same syntactical structure. For instance, the word ‘code’ was defined as follows: “1. Tout corps de simulation entre désir et réseau; 2. Tout espace de nature entre flou et lumière” [1. All the simulation body between desire and network; 2. All the space between flux and light]. Similarly, Balestrini followed the same structure to comment on the other contributors’ definitions. Basically, he reused the same nouns, combining them through the same sequence of ‘tout/toute + noun + de + noun + entre + noun + et + noun’ which he used in his own definitions. For example, Mario Borillo had defined ‘code’ as “Réalisation matérielle de morphismes entre structures formales discretées”. Balestrini commented with “Toute structure de morphismes entre réel et matérialisation”. Philippe Curval, to mention another example, had defined ‘code’ as “sens de l’honneur. On dit: ‘se mettre en code’ pour exprimer qu’on baisse les yeux devant la loi”, to which Balestrini responded with “Toute expression d’yeux entre honneur et bassesse”.

Unlike *Tape Mark I*, the combinatory poetics here had another function. By recirculating the same key nouns used by the other contributors, Balestrini seemed to point to a certain necessary conventionalism in the use of language within networks. While in *Tape Mark I*, through programming and randomness, computers were meant to free language from predictable patterns and produce new meaning, *Epreuves d’écriture* results in a sort of standardization of language. It is particularly interesting to notice how Balestrini explores the concept of ‘syntactism/ a-syntactism’ in different ways in *Tape Mark I* and *Epreuves d’Ecritures*: in the former case, he aims to deconstruct the syntax of the original texts and free new meaning by reinforcing ambiguity, indeterminacy, discontinuity, and polyvalence; in the latter, the experiment demonstrates how networks tend to limit the syntactical possibilities of the language.

CONCLUSION

This article has demonstrated how Eco’s theory of ‘open text’ establishes the coordinates for understanding electronic literature on different levels. First, it lays the foundation of formal theory and the practice of ‘open textuality’ that inspired the Italian *Neovanguardia* and the early electronic literary works by Balestrini. Second, with its focus on co-agency (between authors and other human and non-human actants) and intermediality, it provides a formal model for articulating the poetics of ‘openness’ in later experiments with electronic literature, starting from Balestrini’s. If Eco used the modern concept of ‘*opera aperta*’, which is so deeply informed by scientific knowledge, as an effective methodological tool for exploring ‘open textuality’ and how artists have dealt with chaos, indeterminacy, probability, ambiguity, discontinuity, and polyvalence in cultural history, surely we can use it to analyse its subsequent metamorphoses from modernity to the digital age. Third, Eco’s theory offers the model of an interdisciplinary framework to critically explore the interrelation between social, scientific, economic, and Marxist theories—as exemplified in “Del modo di formare come impegno sulla realtà”. I find this latter approach most useful in examining how electronic literature has confronted mass media, information society, late capitalism, and, in particular, ‘digitality’ as cultural logic, enacting different politics of openness.

What has also emerged in the discussion is that, in electronic literature, we require an epistemological shift to understand what ‘poetics’ and ‘politics’ mean and how they reveal the inner logic of hybrid texts made of literary forms, electronic media, and other arts. The analysis of Balestrini’s works first demonstrated how, by choosing to go beyond the printed page and resorting to electronic media, writers can challenge, reconfigure, or reappropriate symbolic forms, modes of sociality, or cultural values. Second, the full material engagement with electronic media has facilitated a pragmatic confrontation with the material apparatus of cultural production. Balestrini’s poetic and political gesture has been enacted not only on an

imaginary level, but also on the material level of transformation of the means of communication, challenging the economic and cultural system of rationalization, broadcast media, and other forms of hegemonic discourse. In this respect, his work problematizes literature's place in an ecology of media, not only at an ideological and figurative level, but also at an anthropological and economic level. Significantly, this has demonstrated that so-called electronic literature, which can also be described as the creative and critical interplay between different media and modes of expression, consciousness, and communication, plays a crucial role in furthering understanding of our media ecology.

This brings me to my final point. Eco acutely perceived that media present themselves as a two-faced Janus. On one hand, they offer empowered forms of expression and communication; on the other, they conceal ideologies and a sense of development that may not coincide with actual progress. Similarly, an 'open work' is exposed to two-faced technological processes of 'digitality'. As we have seen in Balestrini's various experiments, new media may at first appear to be empowering in terms of self-expression, but could become controlling and/or standardizing. In this sense, electronic literature can help us rethink the ideologies inscribed in the media we use every day and reconfigure their ontologies in new creative forms. The estrangement produced by transferring literary forms into new media forms of expression—and in turn new media into literary forms of expression—can give shape to invisible alienation in our technological society and our communications, be they literary, televisual, cinematic, or digital, which we would not otherwise notice. Ultimately, Eco's 'openness' could be intended as a metaphorical function of 'entropy', which, in turn, assumes the ethically loaded connotation of *différance*, in Derridean terms, indicating the liberating possibility of self-renewal, emancipation from hegemonies, and the embrace of the chaotic, but regenerative, magma of the universe and its endless possibilities.

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TO CITE THIS ARTICLE:

Patti, E 2021 Umberto Eco's *Opera Aperta* and the Birth of Italian Electronic Literature. *Modern Languages Open*, 2021(1): 20 pp. 1–13. DOI: <https://doi.org/10.3828/mlo.v0i0.381>

Published: 17 December 2021

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