Reynaldo Thompson, Tirtha Mukhopadhyay *

Art on the Divide Line: Experiments in Art and Technology in India and Latin America

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Reynaldo Thompson studied architecture at the University of Guanajuato and at the Polytechnic University of Catalonia in Barcelona. In The University of Texas at Dallas he obtained the Doctoral degree in aesthetic studies under the direction of Doctor Richard Brettell. He has participated in different exhibitions both individual and collective and conducted shows in Mexico and abroad. He served as director of the Department of Art and Business of the University of Guanajuato and is currently focused on researching art, science and technology in Latin America.

<thompson@ugto.mx>

ORCID: 0000-0002-9324-1924

Abstract In this paper, we discuss the causes of regional variations in electronic art. Mapping regional achievements in electronic art requires understanding of resources of education and advancement of engineering in locations of economically productive cultures. If we think of development of algorithm as the driving cause of innovations in electronic media art we shall find that more regional niches are not lagging far behind – at least not in alternative market locations like India, or even China, although results are not so encouraging in Africa and the Eurasian countries.

Keywords Art, technology, India, Latin-America, AI.

Tirtha Mukhopadhyay, PhD is Professor of Art and Enterprise at Universidad de Guanajuato, Mexico. He is multi-disciplinary scholar who taught at Presidency University of India (1996-2000), University of Calcutta (2000 -2016) and at University of Texas at Dallas from 2002 to 2005, before migrating to Mexico. He was Fulbright-Nehru Senior Research Fellow at the University of California, Santa Cruz, USA from 2013-2014. His publications include books like 'Affective States in Art' (Proquest-UMI) 'Cezanne to Picasso' (Calcutta University Press, India) and more than 50 articles on creativity, cognition and aesthetics, digital art, visual anthropology and literature, that were published from reputed publishers like OUP, IOS Press, MIT and Atelier-Etno. Mukhopadhyay is also a poet in the Bengali language. He is the Chief Editor of an indexed interdisciplinary journal called 'Rupkatha' since 2009.

<tirtha@ugto.mx>

ORCID: 0000-0002-2707-390X

Arte na Linha de Divisão: Experiências em Arte e Tecnologia na Índia e América Latina

Resumo *Neste artigo, discutimos as causas das variações regionais na arte eletrônica. Geolocalizar conquistas regionais em arte eletrônica requer uma compreensão dos recursos educacionais e o avanço da engenharia em locais de culturas economicamente produtivas. Se pensarmos no desenvolvimento de algoritmos como a causa motriz das inovações na arte da mídia eletrônica, descobriremos que mais do que alguns nichos regionais não foram deixados para trás, pelo menos não em locais de mercado alternativos como a Índia ou mesmo a China, embora os resultados não sejam tão animadores em áreas como a África e os países da Eurásia.*

Palavras-chave *Arte, tecnologia, Índia, América Latina, IA*

Arte na Linha de Divisão: Experiências em Arte e Tecnologia na Índia e América

Resumen *En este artículo, discutimos las causas de las variaciones regionales en el arte electrónico. Geolocalizar los logros regionales en el arte electrónico requiere la comprensión de recursos educativos y el avance de la ingeniería en lugares de culturas económicamente productivas. Si pensamos en el desarrollo de algoritmos como la causa impulsora de las innovaciones en el arte de los medios electrónicos, encontraremos que más algunos nichos regionales no se han quedo atrás, al menos no en ubicaciones de mercados alternativos como India o incluso China, aunque los resultados no son tan alentadores zonas como África y los países de Eurasia.*

Palabras clave *Arte, tecnología, India, América-Latina, IA*

Introduction

A key factor in the development of art and technology in a globally connected world lies, among other things, in the founding and effective stimulus to education in the region, especially engineering education and also cultural entrainment through humanistic education, like the arts. Drori's reference to the *Digital Innovation Divide* should help us understand the difference that economics makes in the creation and appropriation of the contemporary arts. Arts, like contemporary media art, are produced in a global, market-driven, and technologically conditioned narrative of normative and legitimized values – which implicate subjects in a system of possessions and aspirations for objects (Drori 2010; Schmitt and Butchart 2014). Yet the human factor in the process of creativity (i.e., historical-creative contexts, or socio-economic contexts of creativity) is very important. It is not easy to understand how nation states or collectives are culturally inspired. There is no definitive ethical impulse for creativity. If, for the sake of hypothesis, we accept the Hegelian definition of creativity – it is perhaps easy to explain why certain societies or *habitus* clusters (and may be even nation states), are driven by unifyingly inspiring or impulsive ideas and why mass or social awakening (like that of German unification in the nineteenth century) – could influence creativity of artists. Colonial /imperial expansion has also inspired flexion of ideas, philosophy, invention and innovation. Creativity is carried over from forms of extreme hegemony and repression along the frontiers of colonial cultures. The foundation of the new imperial museum in Napoleonic France attests to the paradoxical growth and efflorescence of 'art' in the new world order, just as it did in the millennial past. It is difficult to assess the subliminal energy of populations, and why or how people develop intrinsic drives of invention and innovation through self-education and creativity, especially on the large collective scales of history, such as we have seen in the impetus of Puritan capitalism in North America, or the revolutionary spirit generated by Marxist ideas in the twentieth century. The upshot of such evidence is to show that innovation and experimentation in art and technology are caused by various kinds of human impetus, in various contexts of creativity across ideological realities.

Digital innovations may be studied in terms of the relationship of educational achievements to this process of the self-expression of a nation state or culture. Innovations start from preconditional stability in education. Education and innovation result from impulses that a regional economy may successfully foster for itself (even within larger historical or political affiliations at a given moment of time). The idea of education and development evidently inspire people despite the presence of various odds and historical contingencies. It is probably above all a question of the human spirit and its indomitable self-assessment, and its willingness to do better for itself. Hence the digital innovation divide may be correlated to

an education divide. Some cultures are educationally advanced and are innovative despite economic backwardness. The educational achievement of certain global locations like India or China and to a good extent Latin America, is supported by cultural factors but it is also a consolidating aspect of the political and economic development that these regions are experiencing for themselves. In case of India the educational impetus, coming out of the democratic-revolutionary struggles against British imperialism was complemented by a pre-existing intellectual culture within entrenched Hindu and Islamic renaissance aspirations of the last four hundred years. In China, new Maoist communism, and the aggressively expanding culture of progressive ideas, fueled by a consolidation of the state (political) elite, initiated educational reform in favor of contemporary technology. In Latin America, as Carlos Mariategui argues in the last century, Jesuits already inspired a technological education consistent with the secular education of North America. In the Americas again, European educational ideas, absorbed the consciousness of indigenous technologies of the continent. Now a breach caused through the process of conquests and hegemonic control of one culture over another seems irrevocable. Indigenous technology such as those of the Aztecs, Mayas or Incas were indeed very advanced but they have died out in the transmogrifying realities of colonialism. Educational reform and progress in non-Anglocentric locations (like Latin America) have inspired great visionary progressive achievements in civil engineering, architecture, infrastructure, and agriculture and above all in artistic innovation, and has also – likewise - anticipated digital innovation through the imaginative use and applications of computational sciences. Hence, there is an education divide which reacts upon and affects the digital innovation divide. A government project in India, thoughtfully executed by young professors in technology institutes of the country, consisted of travel to distant locations of the country in buses equipped with satellite connectivity and computers charged with batteries, for spreading awareness about internet. This older picture of digital connectivity (in the seventies) radically transformed in the last twenty years with technological interventions of the free market, and the spread of a contemporary education. Technical education with basic computer equipment and training courses in software has revolutionized higher education in India.

But technology functions more self-catalytically in the sphere of industry. Investment in innovation, supported by state funding, harnesses both education and knowledge or expertise, and on the other hand the power and unremitting need for more investments. Coupling theoretical expertise with application skills, and knowledge, with investment produces concurrent flows in economy: both of demand and growth. This discussion is most relevant to the manner in which innovation is applied to technology. There can be no better context of understanding this process except through an understanding the history of innovations in general, and

the history of art. The development of a simple App or a Program such as one that manifests in a simple Instagram post, reveals how two concurrent aspects of human activity flow into each other – medium and art, technology and innovation, market behavior and education. Technology develops through the leap of creative faith in innovations. Indeed, innovation is everything. Innovation is the skyhook that conditions human activity; innovation attracts talent, commitment, exploration, and metamorphosis through research. Innovation fuels break-through in products, goods, services. Innovations foster dynamic social clusters. It also influences talent and resource flows. The brain-drain of educationally advanced and trained personnel to those industrially advanced regions of the world which are experiencing industrial expansion and investment rich climate, is a case in point. Contrarily, the flow of resources and innovations to educationally rich regions, is also evinced by the flow of industries from more developed economies to less developed economies with educational or skilled personnel, like migrating industries from Silicon Valley California to locations in China and India. This process is somewhat different from other kinds of population flows - for example that of the flow (or migration) of people experiencing poverty to other resource rich regions. Human innovativeness may be visible not only in big expansionist economies but also regionally in economically compromised locations. The correlated factors for innovativeness are not always not easy to define and it is a profoundly human impulse. The innovations in culture and art from all possible locations would have to be respected and valorized.

Algorithm and AI in Art

Programming algorithms are a domain of research for engineers and computation scientists - what has *art* got to do with it, or philosophical assessment? Probably precisely this is the point. Art historians consider the real human value of the artwork - even if it were an infinitesimal aspect of the complex scenario of art and technology. In case of electronic media arts and illustrations, both in visual as well as aura contexts, computational programming generates a vast array of patterns on a sensorial plane, and sometimes with astounding near 3D, i.e., stereoscopic / stereo-sonic effect. Fractal art, for example, has been popular since the sixties. Coupled with such experimental forms which have been developed over several decades, CGI and *AI* has recently been instrumental in generation of pattern art for several platforms like video, multimedia, game and animation. Complete or perfect AI, or Turing's AI, is no more than a fantasy or artist's myth. Human manipulation is necessary for all algorithms that generate aesthetically meaningful patterns. Cognitive gridlocks give direction and meaning to algorithm. These cognitive limits are intrinsic to human sensibility, and

for a cognizable design to emerge in the first place. They are like natural templates which give splay and freedom to algorithmic data, so that a combined effect is created. Hence, we could consider algorithm as an epistemological tool for cognitively meaningful digital visualization. Even big data visualization is dependent on such cognitively defined visualization. Consider how IBM and Microsoft have built huge data visualization formats with graphic interface. Video game programming and dynamic data visualization are used in several contexts of the new media art. In this paper, we refer to this specific *niche* of data art in Asian and Latin American countries, whose resources pertain to lower budget and financing schemes, whether academic or industrial, yet because of reliable education inputs and years of dedicated research and theoretical engagement with computation these economies have produced innovative models. Algorithms have been used and manipulated by experts and engineers working in the intersections of art and technology to reify patterns and visual *simulacra* that have been nurtured and sacralized in these traditions for thousands of years. They have successfully evoked and preserved the memory of lost cosmologies. This reverse practice of using algorithm for traditional folk templates in some Asian and Latin American contexts of art, has been a hallmark of much recent algorithmic art.

Here we may thus indicate towards the relevance of algorithmic art to the crisis posed by the digital innovation divide, *vis a vis* the education divide? How could algorithmic art relate to our future, especially in cultures which are not willing to be totally absorbed by a global industrial culture? These are questions that we have planted at the base of all our historical search for regionally valuable expressions of digital art. We shall come to the point where some exemplary art works, innovative and culturally inverted in the soil and nature of a location, opposes globally invasive art. The roots of these processes are interesting. The arts cannot be separated from the ideology in which they have their birth and development - their history, as it were, involving the racial, political and cultural struggles of the people who belong to them. Witnesses of the second World War developed ideological affiliations in arts. Artists have thus affirmed new media affiliations of the twentieth century. The fracture of social life caused by the National Socialist ideology in Germany, and Europe, and the migrations of families to Latin America, and the *novela* of settlements in a new territory, the Jewish experience of the Holocaust, have stimulated the development of ideologically driven art forms. The sensitive art of Martha Minujin, in Argentina, created with the spirit of the rebellion of the sixties, as much as with the spirit of the great Civil Rights movements around the world, the often lost and found *sensibilizacion* of identity through hallucinogenic or entheogenic art – and the subsequent journey of the digital *vanguardia* in Latin America (of Manuel Felguerez or Waldemar Cordeiro) , has all valorized the marginalized and deep-seated concerns of the continent's displaced artists in the

last fifty years. We mention these artists here in order to conceive a line, a current or history of ideas as Mircea Eliade would call it – in deference to the floating twigs across the sweeping cultural formations of the time. We mention this more so as to demonstrate the richness of new media art impressions, that expresses itself in the formations of Cordeiro, Minujin or as in the Brazilian artist Cildo Meireles: in the search of truth for the dislocated human. Meireles speaks of the undermined people in a work (semi-audio installation) called *Babel,* a fluxus piece, pitted against the singular and hegemonic language of globalization. Critics have foisted Meireles works called the *Labyrinth* and *Babel* to *dislearn* (or unlearn) globalization (Herkenhoff 2001). Underneath all of Meireles' art is the subconscious awareness of displaced peoples, expressed in terms of (a) the fear of the loss of voices of the indigenous peoples (b) the creation of artistic shock for the right-wing and (c) the continuation of the regional color. Not only this, the advanced educational environment in several cases, in Latin America, one engineered by the Church in its early phases, and then developed by means of stated-aided programs after the Nationalist awakenings of the twentieth century, have all played a key role in inspiring the digital innovations. Yet the continent has carried in its heart the divided memory of its colonialism, and its hegemonic imbalances. The digital art history has responded to that divide in interesting art works as that of Meireles (Brazil), Felguerez (Mexico). These artists were products of the Universities and academic institutions that have shaped much of the ideology and ardour of creative artists of the continent.

Radio to New Media in Latin American Art

How do we arrive at this experimental juncture of the algorithm of aesthetic patterns? The evolutions begin in a way that is inextricable from the ideology. We could concentrate briefly on the trajectory of artistic formats, starting with psilocybin fractals that Marta Minujin had conceived in Argentina. She took up radio as part of her conceptual machinery for a performance– to create a window of communications. Technology in Latin America has since early twentieth century attracted the attention of artists. In the late twenties, Manuel Maples-Arce published his *Stridentinst Manifesto* where he stated his ambition of using the radio to reach a larger audience. In the sixties Argentinian artists such as Oscar Masotta and Marta Minujin embraced the new media, among them radio transmitters to embark on transmission of performances. Finally, Cildo Meirelles developed his piece *Babel*, a cacophonic compilation of old radio devices that emulated the mythical city of the Middle East, Babel being a symbol of marginalized dissident voices rather than an ostracized other. See figure 1.

It would be an oversimplification to believe that recursive AI algorithms have influenced visual art alone. The evidence for algorithmic art involving sound technologies is overwhelming to say the least – as it brings together economies like that of Brazil, with the memory of its trau-

Fig 1. **Cildo Meireles's astounding radio collectives in Babel, a resistance to global voices. The idea of 'Babel' like Meireles' other labyrinthine art Through are directly translatable to the effects of multicultural calling and empowerment arts that is celebrated in the contemporary art of the collective group Interspecifics (see Figure 2 & 3 below)**

matic indigenous displacements, and countries like Peru or Mexico, which participate in the collective algorithmic transformations of innovations in paradoxical ways of solidarity and creativity. A group like the *Interspecifics* which developed all its artworks with collective interpolations made by artists from all over Latin America illustrates this method. Members of the group spoke recently on a virtual platform displaying much of their interesting art, especially their sonic installations. Data collected from various sources of human engagement, of radio frequencies emitted by humans leaving their footprint in the larger biome, are collected together, ramified and held together through brilliant channelization - as in the installation in which sonic clouds are fed back into machines that affect the play of in-

digenous musical instruments like drums, strings and flutes. The algorithm brings back the collective memory of human activity through indigenous art forms. This way of looking back at the future gives so much relevance to the art of the *Interspecifics* group, especially in a globally mediated market of art that tends to obliterate identity and the sacred and hidden rituals of our past. In *Interspecifics*, a group of artists, scientist and engineers' algorithm enables the sound cloud art of converging and algorithmically self-orienting sonic patterns. The piece *Recurrent Morphing Radio* (see figure 2 and 3) based on the selection of music through an algorithm that transmits with the aid of a certain amount of *AI* the passing rhythmic current of the most listened or popular music that is randomly selected by the computer. AI manipulated art has re-established that connection for cybernetically evolving visual and sonic art forms – creating an incredibly beautiful niche in the works of *Interspecifics.* Cybernetic theory has taken new directions with the work of *Interspecifics* where they are looking into find ways of communicating not only with machines but with other beings called plants and animals (bacteria, and microorganisms for example). The collective that tries to group experts from the Latin American region is doing to sound what Edmonds, Mohr, Molnar and Verostko among others were doing to the algorithmic image in the northern hemisphere. Sciences and art come together in the *Interspecifics* group as much as the different disciplines and curricula to work on what they call their ontological machines.

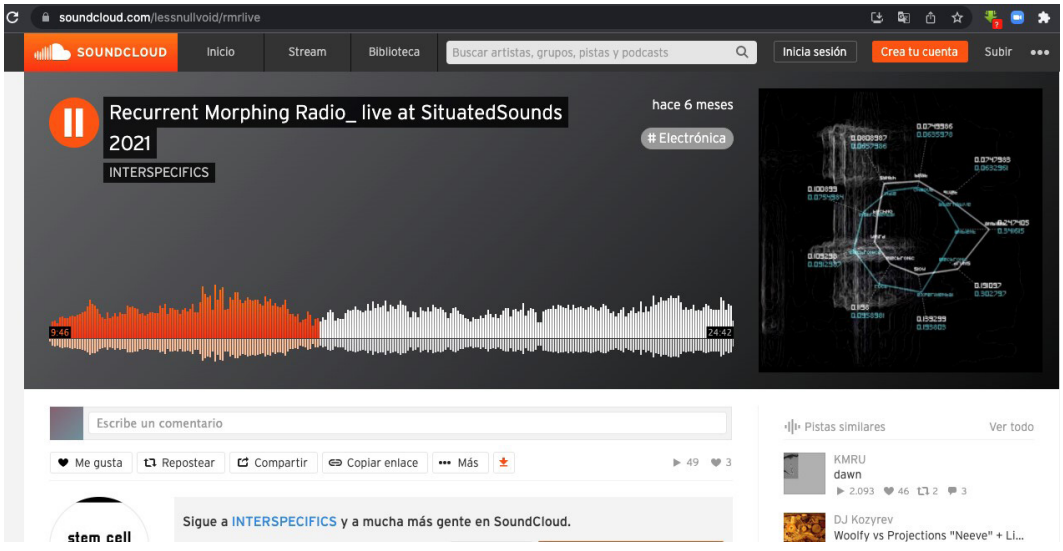

Fig 2. **The Creative Cloud link to Interspecific's sound art Recurrent Morphing Radio.** Source https://soundcloud.com/lessnullvoid/rmrlive Retrieved 17th November 2021.

Fig 3. **Interspecifics video on sonic cloud convergences created by manipulated AI.** Source https://www.youtube.com/watch?v=IXkkhQblM7w

Kolam: A Case Study from India

If fractal art has a visual history to account for - much of its impetus may derive from the magnifications of fractal patterns that are visible following visions afforded by advanced camera technologies and digital photography. The technology of imaging and the computerized reiteration of grammar arrays, which in very early forms of fractal graphics, are perceived in the arts of *Kolam*. *Kolam,* also called *alpana*, are ritual patterns that are made in Indian households. Our objective here as elsewhere has been to draw attention to regionally important or relevant clusters of technologically mediated creativities. *Kolam* is a perfect example of a more modest experimentation with array grammars. Programming a *Kolam* is part of an effort to re-capture the geometrical wisdom of Islamic and Hindu art forms and architectures, the spiritual bases of patterns in art and architecture, so highly valued in Islamic art and praised by such philosophers as Immanuel Kant, as a perfect example of disinterested beauty. (see figure 4)

In "A View of India Through Kolam Patterns and Their Grammatical Representation" Krithivasan speaks of *Kolam* as a decorative design that is drawn on the front courtyards of houses. Drawing of *kolam* patterns is more prevalent in South India, especially in the rural parts. With big apartment complexes coming up in cities, the front yard concept is scaled down, but still small patterns are drawn in front of the front door of the apartments. In North India, the patterns are called *Rangoli,* and they are drawn with color powders." (Kritivasan 2016). Yet there is something fundamental to the *kolam* which could be easily missed in the global vocabulary of fractal art. Visual form in itself cannot be art - unless it is an aspect of a ritual, a pro-

Fig 4. **An alpana or kolam pattern in Indian household from Barabari Dakhshineswar, Kolkata. They are spontaneously done by hands of women who participate in the divine rituals of the family.**

duct of a human intervention consisting of an expression and then viewed by a human responder. The Kantian category of pure taste and aesthetic detachment applies to Islamic pattern arts, which are a heritage art found universally in Central Asia, on the walls of architecture marvels from the Islamic renaissance of the second millennium. Ernst Cohn Wiener called such art as integral aspects of *Turanic* art, the pattern arts of Asia, from Turkey to Iran, in the vast sweep of a renaissance that is seldom valorized in contemporary Anglophone discussions on fractal art. The arts foisted by the market sponsored museums, and big money patronage, despite its links to a vital research and development programs, utterly disregard the ritual value of art, such as is celebrated in forms like *rangoli* or *kolam*. The consciousness of art as a commodity, that arises out of the Roman imperial notion of *art* as a craft, dislodges valuable art like that of the *rangoli* or *kolam*, from its ritualistic value and places it in the middle of a rapacious art market. The value or 'price' of art may be compared to the artificial value of gold. Gold value is ultimately a social construct – unlike ritualistic values, like that embodied in the *Kolam, or the Rangoli* or the delicate Islamic patterns of the *jaffri.* This is philosophically debatable point that may be raised against all the art that has been piled up in European museums. Epistemologically, ritually influenced fractalism appropriates human emotions, and are organized by the perception of divinity or power that gives it ethical and human meaning. The *Kolam*, or the mosque tracery and lattices, the intricate carpet patterns in the weave of Persian carpets and the Kazakh *chapan*, a pre-historic and nomadic art of the Turcik people – in all instances of a similar kind, whether in Brazil, Africa or India, the ritual perception adds

content to art. Hence the glory of those humble programming modules in L-systems that try to generate the *Kolam* and its magnificently creative arbitrariness in human life.

Kolam and *rangoli* programmers are revolutionizing the perception of technological art in India, and the world. This art may or may not have its approvals in the extremely complicated ritualistic acculturation of Indian religious society, but none the less its intrinsic value in the art world, of fractal designs, is undisputed as it counters globalization and re-positions indigenous and local variations of technological media. (see figure 5)

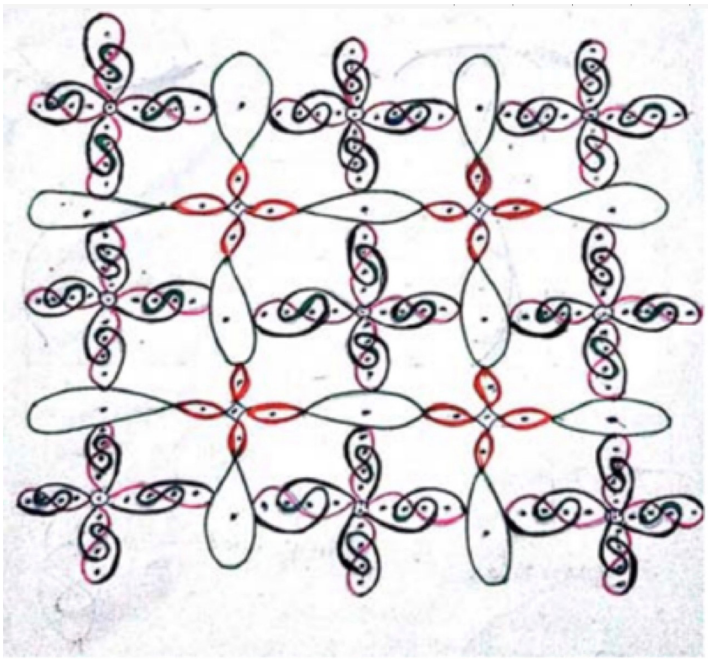

Fig 5. **A grammar array generated kolam or rangoli pattern in its basic manifests as developed by AI array grammars**

Conclusion

A very early book on *Cybernetics* that was written in Mexico by Norbert Weiner who was working at *the Cardiology National Institute*, and in a team lead by Arturo Rosenblueth. Cybernetics, pioneered intellectually by Norbert Weiner, had its origins in Mexico and India, in distant lands already advanced in the arts of geometry and mathematics. There is an apparent disjunction in the way we have considered different art forms from different regions of the world – a disjunction that is deliberate. The arts are united by the media of AI and algorithmic manipulation. Yet the contexts in which these new media forms flourish explain how regional cultures and their technologies should be discussed in contemporary aesthetics. If we do not pay attention to the impetus, ambitions, and visions of regionally rooted artists we would never be able to create a truly multicultural canvas of

the history of contemporary art, especially art and technology. The history of art and technology stands in danger of being erased and re-phrased in terms of hegemonic structures of knowledge, digitization and innovation across the impending wave of a divide.

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