Gambierra and the In(ter)dependent Condition
Ecological Relationships in the Construction of Experimental Musical Instruments

ABSTRACT This article analyzes the relationships of interdependence between musicians and natural or artificial agents of their environment. Considering processes of recycling and refunctionalization of materials with artistic purposes, such relationships are observed in the construction of instruments involving gambierra in their manufacturing, with a focus on the specific case of an experimental music duo, Senyawa. The paper is theoretically and epistemically grounded in studies focusing on gambierra, media and ecology, and media archaeology. The methodological procedures encompass analyses of instrument manufacturing processes developed by Wukir Suryadi, one of the members of Senyawa. As a contribution to studies of sound and culture, the article concludes that, through creative practices involving obsolete media materialities, gambierra processes allow us to observe the continuous relationships between technology and nature in the design and manufacturing of technical artifacts. KEYWORDS gambierra, material culture, media and ecology, reutilization practices, experimental music, interdependence

INTRODUCTION
Experimental music scenes are often imagined as spaces of overarching autonomy. In the music press, for instance, the term “independent musician” is commonly used to describe a vast range of artists, including more experimental acts signed to small labels. Aside from a status within the music industry, though, the jargon of independence might not characterize the actual practices of experimental artists. On the contrary, often one can notice a strong condition of interdependence arising from different sorts of relationships in musical environments as well as from certain infrastructural aspects of these milieus. Such interdependence has been noted in several studies, at least on what refers to the wide chain of human agents involved in the daily routines of marginal music scenes,¹ the establishment of affective relationships between cooperative artists,² or the collective and vibrant development of institutional apparatuses for experimental musicians.³

In this paper, we intend to identify and analyze another sort of relationship of interdependence within the experimental music milieu: We highlight here the interdependence between musicians and natural and artificial agents of their environment through practices of gambierra. In common usage, the Brazilian Portuguese noun gambierra is associated with cheap, practical, improvised solutions to diverse sorts of problems. Moreover, by observing the word’s use in art and media contexts, gambierra can be situated as a practice of technical plasticity that can potentially rearrange artifacts and devices. Usually, gambierra refers to a more fleeting solution, a shortcut that enables someone to use a specific device or
service that would otherwise be restricted or unsuitable. We understand that, due to the conjunction of common objects with different kinds of informal techniques, such processes should also be seen as resulting in the creation of new, ingenious artifacts. Furthermore, we emphasize that there is a “techno-ecological” interdependency that is inherent in these practices, in the sense that there is a continuum between any technologies and organic environments, and that such a continuum is foregrounded in practices of gambiarra. Considering processes of refunctionalization of devices, tools, and pieces of equipment with artistic purposes, this condition of interdependency can be particularly observed in the manufacturing of instruments and other technologies for experimental music production.

It is also worth noting that we will not necessarily refer to examples of cutting-edge, brilliant, and well-publicized technologies, but to technological artifacts that result from processes of musical crafting in contexts of artistic experimentation with discarded or outmoded materials found in local surroundings. We analyze specifically the case of the band Senyawa, formed by the musicians Rully Shabara and Wukir Suryadi. Experimentally, Rully overlays elements of traditional Javanese vocal techniques to drones and percussive and melodic motifs produced with Wukir’s musical instruments. Such instruments are predominantly crafted from reused bamboo artifacts that are electrified and transformed into apparatus with widely versatile aesthetic outputs.

Many other artists besides Senyawa create their own instruments from recovered obsolete objects by all sorts of gambiarras through what we might call gambioluthiery, a term coined by Giuliano Obici. Experimental sound artists and musicians like Chelpa Ferro and Eletronicos Fantasticos take advantage of the continuous hardware replacement necessitated by changing industry standards and audio formats. They act over the imagery of obsolescence and within the physical remnants of disposed technical objects to build the instruments with which they produce their artwork.

Experimental techniques described by Nicolas Collins such as hardware hacking—characterized by the act of opening objects to modify and program them for other uses—and the utilization of creative experimental electronics by circuit bending are indicated here as gambiarras that add themselves to many other handcrafted techniques, also bringing attention to the ecological aspect of technological production. These gambiarras establish experimental processes capable of rehabilitating disused artifacts, while building a practical and laboratorial relationship with media archaeology. These procedures demonstrate a relationship of interdependence between musicians and their environments through experimental technologies. In this sense, the terms interdependence and habilitation, which will be described in detail in the next section, seek to highlight how gambiarras are useful in effectively supplying the musician with new competencies in a given sociotechnical environment through the use of obsolete materials. This underscores how certain obsolete artifactual structures are revived, executing other functions and promoting new relationships in experimental music circles.

To situate this discussion, in the following section we elaborate on the ecological dimension involved in the reutilization practices promoted by gambiarra in order to define more broadly what the interdependency condition between practitioners and their technological and cultural environments is about.
GAMBIARRA AND REUTILIZATION AS MEANS FOR HABILITATION

Amid the habitual flow of techno-capitalism, we can say that the empirical work of recovering abandoned materials has an epistemological dimension: It allows the rescuing and the re-operationalization of outmoded objects that are often forgotten by contemporary societies, promoting particular forms of knowledge and practices that go way beyond consumption. This type of knowledge emerges specifically through the development of techniques and skills to assemble and recover such artifacts in contexts where obtaining practical, immediate knowledge is needed. Although it requires from individuals a mixture of artistry, ingenuity, and curiosity, gambiarra is still primarily an experimental practice. By developing and testing experimental approaches, gambiarra practitioners are training themselves to implement more systematic and methodical solutions to their projects with the technical means at their disposal.

We highlight here some theories that can contribute to an understanding of the particular forms of knowledge that emerge from experimenting with obsolete media. The action of investigating and reinstituting disused media helps to promote a sense of “broken world thinking,” the conscientious recognition of the important role that reutilization, recombination, and reconfiguration should occupy in the contemporary world. These operations reflect human values and activities related to care. In particular, when the obsolescence and the life cycle of technical devices are acknowledged in their complexity, the development of systems to reuse and refunctionalize these artifacts can be a beacon for eco-social thinking. In this sense, as science and technology studies (STS) scholars such as Steven J. Jackson have pointed out, the immediate material dimension of reutilization raises a series of pressing questions:

Who fixes the devices and systems we “seamlessly” use? Who maintains the infrastructures within and against which our lives unfold? […] How are human orders broken and restored (and again, who does this work)?

In this sense, the practice of gambiarra represents a bond between these two regimes, of media in their time of obsolescence and their posterior salvaging, capable of awakening a manner of thinking about and for worlds broken at the fringes of progress. This also becomes an important model to think about media, especially in an era when they tend to reach a considerable degree of superfluity in everyday life through processes of continuous renovation on an industrial scale, which results in its abundance and redundancy.

With the reutilization practices of gambiarra, though, we can shed some light on the unexplored potentials of these superabundant technical devices. In light of a natural history of electronic junk, the processing of dead media, and zombie media rescuing, we can consider how this redundancy also produces a multitude of short-lived technical objects. Their obsolescence also speaks of the environmental dimensions of media from the point before their industrial production until long after their disposal, whether through the extraction processes of raw material for the physical production of musical discs, instruments, and devices or in the disassembling and disposal cycles of obsolete objects. It is in this sense that media theorist Jussi Parikka attributes great significance to the observation of discarded and destroyed machines, highlighting the materiality of
technological devices in a very earthly sense: strictly, the rocks, minerals, and metals that compose the “metallurgical prelude of media” and that explain (and also compose) the longue durée of technical objects in the earthly metabolism. When developing gambiarra practices, musicians and other artists put such deterioration processes momentarily under suspension, by repurposing pieces and partial mechanisms of these outmoded devices into novel and hybrid artifacts.

The physical dimension of technical devices is also directly related to the way instruments sound and how we habitually perceive and recognize sounds. It is not by chance, therefore, that through a radically material practice of media archaeology, the science of sound may comprehend technologies more profoundly in their epistemological nature, expressing the materialities of media. Thinking about the “materiality of media” in this case presupposes comprehending, for instance, how everyday electronics depend on the utilization of certain crystals to work properly. Many of the electronic components found within media artifacts contain small piezoelectric crystals in their interior, such as quartz crystals, that are often used in clocks, microcontroller chips, and computer motherboards. The crystals define the frequency of oscillators, being responsible for their functioning rhythm. In their material dimension, the same elements that contribute to how these electronic instruments work and sound participate in the profound deterioration of media at a later stage, when they are discarded. Materials such as these crystals are valuable from their extraction until their recycling, after the pieces of equipment are no longer in use. But the rest of the equipment is set to become electronic waste. Gambiarra practitioners connect these different material dimensions of technological artifacts, making use of the pieces that define their aesthetic qualities by technically repurposing them before they reach a stage of deterioration.

With this initial overview, we can say that throughout recent years many projects have already recognized the necessity of thinking of a place for the broken, the discarded, and the reconstituted in studies of technical media. These research agendas also brought significant contributions to the field of communication and the arts. What we suggest here, as a complement to these studies, is a rethinking of obsolete media’s place in inventive spaces of refunctionalization such as in musical practices of reutilization through gambiarra.

The technical gesture of gambiarra is characterized, as we understand it here, by producing a habilitation for something. In this sense, at least in the artistic context, habilitation is the process of qualifying an object or subject to perform an action that was previously inaccessible. It refers to the practical outcome of a set of experimental techniques (gambiarras) applied to technical objects that generate qualitative modifications in the object and the tasks it performs. After the object undergoes such a process, it can perform new functions, sometimes completely different from what it performed before. As we understand it, the individuals developing gambiarras also go through a process of habilitation, becoming able to perform and reproduce new tasks with their creations. In the case of experimental music, for instance, this can refer to a gambiarra that allows musicians to create their own instruments from discarded materials or that allows an artist to create a sound installation from outmoded technical devices. Since the
practice of gambiarra demands from artists a previous study of the artifacts to be modified, experimental and creative methods are also elaborated along the way. At the same time that this condition produces a degree of detachment from established technological forms, it also critically stresses the continuous relationships of interdependence between subjects, technologies, and environments.

This habilitation process stems from the fact that the new versions of the altered artifacts, upon being discovered from obsolescent materials, return to their sociotechnical environments with a notorious innovative potential. At first glance, few things could seem more conceptually distant than the ideas of reutilization and innovation, given that we usually think of innovation as a completely pioneering endeavor: a creation mystified at the edge of the production chain, the fruit of genius trailblazing engineers (usually men). The reutilization of devices normally appears at the end of the chain—even though it is only an imagined end, given that the biochemical destination of these objects as dioxins and furans, among other toxins, can be found in landfills and dumpsites often far away from the major global consuming centers. Therefore, the refunctionalization of devices carried out by gambiarra practitioners delays the obsolescence timeframe that was planned for these artifacts while simultaneously providing them with an alternative lifespan.

The habilitation constituted by practices of gambiarra stems from this creative potential encrusted with processes of reutilization, producing breaks in the accelerated cycles of production (and dumping) of newer technical artifacts. As Jennifer Gabrys puts it, whether in a ruined, preservation, or recombination state, “obsolete devices begin to express tales that are about something other than technical evolution.” The program of gambiarra thus allows us to question precisely the stories of inherent progression that are usually embedded in the imageries of novel designs. It reinforces the epistemological value of the practices of actors dedicated to experimenting with obsolete media. If the result of their work is hardly cleaner or shinier than factory products (which is far from their intention), it is likely that gambiarra artists habilitate, alternatively, a distinct epistemological perspective: With the knowledge of reusing and repurposing technical devices, they purport the broader relationships of interdependence existing among machines and environments.

So far we have argued theoretically that, as material practices presenting an ecological aspect implicit in technical mediations, gambiarra experiments exert relationships of interdependence between subjects, technologies, and environments. Such relationships often underlie processes of habilitation of objects and subjects. Next, we will present how these processes happen in the case of a specific artist’s experimental construction of gambiarra instruments.

**GAMBIARRA AND INTERDEPENDENCY IN SENYAWA**

The possibilities of technical intervention on media materialities promote alterations in environments and originate from these same ecosystems. Within the scope of this article, it is worth thinking of sound works performed with instruments experimentally altered...
by the artists themselves. Currently, we follow increasingly frequent experiences involving contemporary software and devices being combined with traditional instruments and musical forms. The particular timbres of these instruments and the technical infrastructure of audio production available locally usually combine with audio recording and processing equipment of transnational brands, with all of these agents leaving their footprints on such works. As stated by media scholar Marcelo Conter, this demonstrates among other things the “intricate relationship between the mechanization of amateurism through the appropriation of audio technologies and aestheticization resulting from using these same technologies, which leave aesthetic traces in recordings.” To put it simply, the aesthetic output from these processes of experimentation with media materialities mixes elements from transnationally available sound technologies with locally based cultural techniques.

Such is the case of the Indonesian duo Senyawa, formed by singer Rully Shabara and multi-instrumentalist Wukir Suryadi. According to the curators of the art and technology festival Ars Electronica—at which the duo received an award for digital music and sound in 2017—the music of Senyawa “highlights the possibilities between modern (audio) technology and traditional/ancient sounds.” Senyawa works within a diverse set of niches, encompassing both international scenes of contemporary experimental music and sound art as well as more regional artistic circles in Southeast Asia and Oceania. As highlighted by curators of the Instrument Builders Project, an artistic program based in Indonesia and Australia, the duo also works within a local framework by developing cultural projects in their studio in Yogyakarta, where they explore diverse music traditions and techniques in self-organized workshops and performances.

**FIGURE 1.** Senyawa: Wukir Suryadi, left, and Rully Shabara. Photo: Anna Spysz.
While toggling between concerts in underground music environments and performances held in contemporary sound art venues, the musicians of Senyawa are also sympathetic to an open-source rationale. Open-source systems refer to license-free models and services available for use and experimentation free to any interested user. It is a concept appropriated by several areas beyond the computer sciences field, where it originated. Regarding their application in the arts, these systems inspire artists to appropriate available products and services for the development of new creative models and venues for aesthetic experience. For Senyawa, open-source principles are present from the construction of their musical instruments to the management of the distribution deals for their artwork (strategically elaborated by the musicians from a decentralized participation model where partnerships are directly established with distributors in every locale). In their studio in Yogyakarta, Senyawa also provides lectures, workshops, and other open learning activities. As observed by Yogyakarta-based cultural historian Antariksa, some of the initiatives developed in the studio are inspired by the nyantrik system (of the Islamic tradition in Java), according to which living, studying, and creating are held in communion, within the same space.34

Local factors are also involved in the aesthetics of the duo, mixed with the experimental tones that shape their particular sound. As for the vocal performance, Rully combines experimental techniques of guttural singing with elements from the vocal traditions of different Indonesian islands. The techniques and vocal structures are inspired by musical traditions from Sumatra and Java, the Islamic Rabba, and especially the Moraego singing from Celebes35—mixed up with some death-metal tones. Rully also developed a teaching platform for amateur singers interested in learning and sharing expanded vocal techniques. Wukir executes his own altered sound instruments, usually with the help of other musicians and specialist friends. The cultural environment and the geomorphological aspects of the insular regions also had an important role in the formative experience of Wukir, who traveled various islands as a member of an Indonesian community theater group (Teater Ideot) since his teenage years, preparing Foley effects for its plays with discarded objects such as bottle caps.36

Wukir’s instruments, which we will analyze in more detail later, are predominantly made from traditional bamboo tools historically used in gardening and local agricultural crafts, which ended up being replaced in modern times by mechanical equipment. In the hands of Wukir, such artifacts underwent transformations by means of gambiarra techniques such as hardware hacking, when they were habilitated to exert the function of sound instruments. In Handmade Electronic Music: The Art of Hardware Hacking, Nicolas Collins specifically addresses experimental methods and approaches of straightforward hacking and electronics for artists. He argues that hardware hacking, when allied to experimental electronics, allows for greater freedom of material manipulation, enabling the incorporation of aesthetic results through technical interventions in the interior of devices. For Collins, hardware hacking is a procedure for altering parts and/or functionalities of technical equipment in order to (re)configure it. Hacking is frequently utilized in devices considered obsolete or discontinued in the course of technological acceleration. While they are more accessible economically, their use favors reusing parts and
components employed in old electronic devices. In the context of reutilization of broken or abandoned equipment, the act of opening the “black box” of a device and tinkering with its structures may become a critical strategy. Many media artists, aware of political and ecological matters, see this method as a tool for artivism.37

There is a kind of gambiarra that focuses more specifically on luthiery, or the building of instruments, which is very important to the Senyawa case analysis. Gambioluthiery, as envisioned by Giuliano Obici,38 may be defined as the construction of sound instruments specifically through gambiarras—which, in the contemporary sociotechnical context, frequently involves materials extracted from disused electronics. For Obici, gambioluthiery may be conceptually considered a media-archaeological practice happening in a non-linear fashion, not only “from old to new media, but in both directions.”39 When highlighting certain particularities and effects from the interposition of different media, the technical remodeling through gambiarras expands the very notion of a musical instrument. Obici proposes that this kind of fabrication is in itself a sort of pre-instrument that, besides promoting more accessible and cheaper means for musical expression, clears an alternative path in our habitual knowledge of media:

Even in the precariousness and impossibility of utilizing a product, it is possible to invert the roles from consumer to producer, from passive to active, and become an inventor. Through gambiarras the hierarchies that objects, media, technologies, and services proposed to us are inverted. In other words, gambiarra institutes, even if temporarily, the inversion of embedded technical designs, revealing the opposite of the order it establishes.40

As media culture accrues obsolete technological objects, gambiarra artists take charge of recovering part of these structures, implicitly performing physical as well as conceptual experimentation with these devices.

The results of these experimentations—i.e., the gambiarra instruments—provide examples of the sociotechnical environment from which they emerge, including elements of natural scenery, labor occupations, and technological matrices. For the musical group Senyawa, Wukir Suryadi built a series of instruments based on obsolete local technical artifacts, which were altered to become instruments apt for sound experimentation. Some instruments are made from bamboo tools previously used in local agriculture, as well as other rural utensils, themselves artisanal objects crafted from widely available materials from some of the Indonesian islands.41 Such is the case with the instrument shown in Figure 2, which Wukir built from an archaic land-plowing tool called a garu (“rake” in Javanese). The deep and low drones, important to certain Senyawa performances, rely specifically on the robust and broad material constitution of this reutilized tool.

With the mechanization of agriculture, rural producers from Java started having a smaller workforce in the fields, and part of their plowing tradition was lost. Wukir’s intention of employing the rake as an instrument owes not only to its availability but also to the reuse of this traditional technology42 and the history of a previous period of Javanese agrarian culture upturned altogether with its use. Not only the musician but also the object becomes habilitated through its reffunctionalization.
The most utilized instrument in Senyawa performances, and possibly the most versatile instrument constructed by Wukir, is the bambuwukir. This instrument serves as both a melodic and a percussive instrument, allowing for alternate or simultaneous play. The thick and solid one-piece bamboo body measures about a meter and a half and has eleven strings, three of them of steel, which can be played with picks as well as with a violin bow. The eight remaining strings are made from bamboo bark and can be pinched or touched percussively. Wukir also incorporated a contact microphone into the instrument, allowing for the use of distortion pedals and other effects.

The particularly low tessitura of the bambuwukir is proportional to the construction pattern and dimensions of the instrument; therefore, the choice of bamboo directly interferes with the produced tonality. Given this, we can say that Wukir’s music not only is inspired by its surroundings but is also produced in a quite straightforward relationship of interdependence with it: According to curator and musician Takuro Mizuta Lippit, since 2011 Wukir has cultivated in the backyard of his home the bamboo grove from which the raw materials for fabricating his instruments are taken.

After this, however, the low sound from the bambuwukir is processed and mixed to create timbres that are distorted and amplified by pedals of several sources, composed of mineral and synthetic materials extracted, mounted, and distributed in various places worldwide, not unlike the devices many other experimental musicians use around the world. The deep, heavy aspect in Senyawa’s music is fundamentally a result of the mixture between these two dimensions—local and global techniques, knowledge, and equipment. Even though music critic Mark Smith notoriously described Senyawa’s music as operating “on a force-of-nature level,” it would be very difficult to imagine how such magnitude in experimental music could be conveyed without the artifice of guitar effect pedals, amplifiers, and other modern sound equipment.

Physically, the bambuwukir is akin to the sasando, a traditional circular harp from Rote Island, on the border between Indonesia and East Timor. There are a few important differences, however. Instead of being played with a bow, the strings of the sasando are pinched. It has thick strings throughout its entire circumference, while the bambuwukir...
uses only half of the circular contour of the bamboo, leaving the other half of its trunk with a straight cut to support a set of strings that can be played simultaneously through fingering and martelé techniques. There is, thus, a wide variety of possible sound dynamics and articulations, a result of six modifications performed by Wukir on the instrument until he arrived at its current form.

The bambuwukir combines the acoustic qualities of materials found in its surroundings and inspiration from traditional instruments with the paraphernalia used in garage rock bands, such as distortion effects. This combination of old and new technologies contributes to the experimental aesthetics and the heavy sound of Senyawa, which is rich in very low and very high frequencies. Beyond the technical aspects of tones and timbres, there is a general sense of heaviness that emerges from the very way the instruments are handled by Wukir during performances. The relationship between the musician and the instrument is more widely explored in the aggressive dynamics adopted while playing the music. While reviewing Senyawa’s 2018 album *Sujud*, music critic Russell Kuzner wrote that “the concept of heaviness in music tends to be measured in terms of frequency and loudness, where low end vibrations at maximum volume yield the weightiest results.” Kuzner concludes with a figure of speech, stating that the bambuwukir has forged Senyawa’s deep and extreme dynamics, bringing to their sound “another dimension of weight, one that can’t be measured!”

Some of the other instruments underwent different processes of manufacturing, and also present a different set of features for playability and dynamics while performing. Such is the case of the *solet*, for which the musician hacked a kitchen spatula, also made of bamboo, transforming it into a device resembling (with significant distance, including in its temperament) an *erhu*, a traditional bowed string instrument from East Asia. Regarding the dynamics of the instrument, Wukir did not electrify it, opting to use microphones during the performances in order to capture a more natural-sounding, considerably less isolated timbre. Another example is the *akar mahoni*, an instrument for collective use that has a horizontal mahogany sheet as its main structure, upon which several devices for simultaneous musical interaction are incorporated: a deconstructed guitar with a mobile neck, tuning machines, distributed pickups and knobs, leather strips, a sequencer, and optical and electromagnetic theremins. While the other instruments have elements intrinsically highlighting the relationship of interdependence with the natural environment, here the main relation is enunciated by the use of the solid mahogany log onto which the other parts are incorporated. The matter of reutilization rests mostly on the harnessing of musical instruments of different kinds grouped in a bricolage, rather than on the absorption of other not-clearly musical materials through gambiarra.

Through the observation of these reutilization practices in gambioluthiery, we can perceive how Wukir ends up developing a repertoire through his own occupation with the materials, updating it with the aesthetic potentialities of the instruments—both the musician and the modified equipment get habilitated by the practice of gambiarra. Thus, the procedures employed for creation of these instruments, mostly based on obsolete artifacts from the local environment, establish alternative forms of operating with such materialities. Gambiarra makes the habilitation of antiquated materials viable, allowing
them to circulate again through other sociotechnical settings, as fresh instruments presented in experimental music concerts and sound art exhibitions.

The process of radical empiricism$^{50}$ employed by musicians involved with gambiolluthiery must not blind us to the important epistemological component underlying these projects. Implicit care is involved in assembling the recovered artifacts, mobilizing not only immediate practical knowledge (as the efficient results of the gambiarra) but also the acknowledgment of wider cultural and natural affordances available in the environment that arise from the intimate relationship between the artist and such artifacts.

This implicit background form of knowledge is part of a preexisting condition, without which the instruments of Wukir and several other musicians could not exist—or would be very different, to say the least. This situation reveals the intrinsically relational aspect of gambiarra, which must absorb and recombine artifacts according to environmental conditions and contextual needs. José Messias, who analyzes the software modifications performed in hacked digital games, argues that gambiarra is a practice analogous to anthropophagy$^{51}$—the ritual act of consuming flesh or organs from other human beings, a practice said to be conducted by some Amerindian tribes in pre-Columbian Americas, according to 16th-century Portuguese chroniclers. The topic is controversial, as it is disputed by some historiographers due to the political role these chronicles played in justifying the colonial expansion of the Portuguese empire in the South American continent. The term was employed in the art world metaphorically and anecdotal in the context of Brazilian modernism, where anthropofagia referred to modern artists allegedly feeding themselves from other cultures as a drive toward differentiation and a contradictory, potential strength. The utilitarian recovery promoted by gambiarra characterizes a manner of feeding on the other, performing an absorption resulting in a consequent alteration of oneself. In a complementary sense, we understand that in the case presented here, the recombination of available (endogenous or exogenous) artisanal and industrial objects for instrument construction is motivated by an interest in habilitating the gambiarra practitioner and the handcrafted modified objects.

This approach may offer a particularly interesting perspective to surpass a certain fetish for gambiarras that we see developing around the informal solutions adopted and their relationship with the so-called maker culture. After all, it is a tendency that the romanticization of gambiarra and reuse strategies may lead, in contexts withdrawn from everyday practice, to the idealization of precariousness and economic instability—ultimately justifying an understanding of austerity as a means for moral or intellectual prosperity.$^{52}$ Thus, it is better to pay attention to the manner by which reutilization stories are interwoven with different geographical spaces, development conditions, and environmental interdependencies,$^{53}$ so that highly prevalent infrastructural problems, often present in contexts of gambiarra, are not romanticized in this process. This seems especially sensible to us in the case of gambiarra discourse, but also for its equivalents jugaad (in India) and shanzhai (in China). Both terms have been popularly appropriated in nationalist discourses that, in times of intensely precarious work conditions and urban and rural infrastructure, also serve to idealize the conditions of underdevelopment. Or even in
cases where the improvising character of gambiarra is taken as a metaphor for “disruptive innovation,” the concept disregards the residuality of these practices in the face of wider and more profound historical and infrastructural aspects.

**FINAL CONSIDERATIONS**

We aimed to comprehend here the relational conditions of gambiarra, which demonstrate the participation of environmental factors and ecosystemic aspects in the formation of performances, aesthetics, and further aspects of Senyawa’s experimental music making. This argument must not be confused with the radical idea that cultural production is determined by natural factors—a notion that can be found in writings on geography from classical antiquity to the descriptions of nature from the late 17th century, but also in more contemporary forms of environmental determinism. Within this interpretative structure, climate and temperature features are fully responsible for producing certain cultural and psychological characteristics, directly determining human behavior. Our argument here does not seek to point in this politically problematic direction, while at the same time it does not wish to point toward any fashion of cultural relativism. What we intend to highlight here, more modestly, is that one can observe the interdependency between local ecosystems and non-localized cultural techniques in the works of gambiarra practitioners. In this realm, earthly, technical, and human agencies are intrinsically interdependent and do not necessarily adhere to a logic of overdetermination.

The analysis of Senyawa’s instruments, for their creative combination of regional and exogenous technologies, allows for a relational approach to how gambiarra stimulates artists to work with organic and anthropogenic elements from their surroundings. The reuse of these elements habilitates musicians and obsolete artifacts, which begin to be integrated into the media arts. From the care granted to reutilization practices, we can also conclude that gambiarra makes the immanent relationship between technology and nature concrete and evident by setting into motion creative interventions through obsolete media materialities and the broken world of abandoned artifacts.

The observation of the relations of interdependence catalyzed by gambiarra also elicits a counterpoint to the imagery, still quite frequent in the maker and do-it-yourself subcultures, of the individualist artist-inventor constructing their instruments in their atelier in a completely autonomous manner. These activities are intertwined by an entire thread of eco-social relationships in which materials become a part of the particular and the collective, highlighting the conditions of interdependence in creative accomplishments.

As contemporary culture accrues obsolete technological objects, some experimentalist artists take charge of recovering the latent potential of some of these materials through gambioluthiery, enabling aesthetic expressions that could only be possible through them. From a radical empiricist relationship with objects, gambiarra procedures give way to an alternative perspective and provide unexpected knowledge of a different kind about technology and cultural techniques. From this perspective, the continuities between past and present, new and old, natural and artificial are much more consistent than what the habitual rhetoric involving art and technology suggests.
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NOTES
9. Experimental electronic technique used to provoke low-voltage short-circuits in electronic sound equipment to obtain other expressive forms.
24. Jackson, “Rethinking Repair.”
27. Ernst, “Sobre a Sonicidade.”
34. Even though working within principles of the nyantrik system, some of the more ascetic elements of religion are not as strict in the case of Senyawa. For more information, see Antariksa, “The Instrument Builders Project: Hits from the Gong,” in *Nyantrik as Commoning*, ed. Kristi Monfries (Yogyakarta and Melbourne: The Instrument Builders Project, 2015), 64–77.
37. This portmanteau word combining *art* and *activism* refers to the practice of deliberately promoting a political agenda through performative artistic acts, such as the defacing of celebrated monuments and widely known advertisement. See Pedro Danoso and Valentina Montero Peña, “Dissent and Utopia: Rethinking Art and Technology in Latin America,” in *Red Art: New Utopias in Data Capitalism*, ed. Lanfranco Aceti, Julian Stallabrass, Susanne Jaschko, and Bill Balaskas (San Francisco: Leonardo/ISAST, 2014), 136–47. Also see Marcela Fuentes,
40. Giuliano Obici, “Gambiarra e Experimentalismo Sonoro” (PhD diss., São Paulo University, 2014), 54. In the original version, in Portuguese: “Mesmo na precariedade e na impossibilidade de usar um produto, é possível inverter os papéis de consumidor para produtor, de passivo para ativo, e se tornar um inventor. Invertem-se através da gambiarra as hierarquias que os objetos, mídias, tecnologias e serviços nos propõem. Dizendo de outra forma, a gambiarra institui, mesmo que temporariamente, a inversão dos designios embutidos na tecnologia, revelando o avesso da ordem que ela instaura.”
44. In music, *tessitura* refers to the frequency range in which a given voice (such as an instrument) spends most of its time, thus referring to the average range of a particular voice. If a tessitura is described as “low,” the notes tend to be in the lower region of the total range encompassed by the instrument.
49. Bentley, “An Interview with Instrument Builders Project Founders.”
50. We use the term “radical empiricism” here as a means to highlight the highly tentative, experimental methods employed by gambiarra practitioners to develop radical modifications in the devices they repurpose. It is not meant to be mistaken for the philosophical doctrine put forth by pragmatist philosopher William James.