Felipe de Almeida Ribeiro* and Ricardo de Oliveira Thomasi†
*State University of Paraná
School of Music and Fine Arts
Rua Barão do Rio Branco 370, Curitiba, PR 80010-180, Brazil
†University of São Paulo
School of Communication and Arts
Avenida Prof. Lúcio Martins Rodrigues 443, São Paulo, SP 05508-020, Brazil
felipe.ribeiro@unespar.edu.br, ricardothomasi@usp.br

Mapping Out the Origins of Electroacoustic Music Studios in Brazil

Abstract: This research presents a mapping out of Brazilian electroacoustic music studios from 1960 to 2000, especially those that emerged in connection with universities and other institutions. A major criterion was to understand "music studios" as cultural territories, as places for creation, collaboration, and exchange. We present a timeline highlighting the main trajectories of composers, institutions, and events, all related to the development of these studios. We interviewed composers and investigated a wide variety of documents, ranging from scholarly papers and journal articles through books, recordings, and websites. As a result, the timeline introduces the main spaces that have fostered electroacoustic music in Brazil, revealing the idea of *gambiarra* [make do, workaround], a sort of Brazilian DIY culture.

Why Studios?

This article presents a primary mapping out of electroacoustic music studios in Brazil from 1960 to 2000. As part of our methodology, we adopted a timeline-based discussion that has a pedagogical purpose. Timelines alone can distort facts, as seen in the *International Electronic Music Catalog* (Davies 1968), which overvalues the contributions of Reginaldo Carvalho, Willy Correa de Oliveira, and Gilberto Mendes, while ignoring Jorge Antunes, a pioneer in the field (Guerra 2012). We have adopted a selection criterion akin to the snowball-sampling research method (Biernacki and Waldorf 1981) to analyze and quantify the data. This was applied in the analysis of documents—such as books, articles, reviews, audio recordings, and websites—alongside a series of interviews we recently conducted with composers such as Antunes, Rodolfo Caesar, Eloy Fritsch, and many more. Therefore, this timeline was structured on the idea of a "network of facts," in which we could cross-check data.

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Music Studios As Cultural Territories

It is crucial to distinguish music studios from a mere physical space. Electroacoustic music studios are "cultural territories," with their local characteristics. Joël Bonnemaison (1981) believes that space is a vaguer notion without identity, whereas the concept of territory is "essentially the place of exchange between men and their culture." Additionally, Claude Raffestin (1993) observes that "by appropriating a space, concretely or abstractly, the actor territorializes the space." Therefore, the meaning of "music studio" should be considered in a broader scope.

The development of electroacoustic music in Brazil has resulted from the action and effort of a few people who had to adapt ordinary spaces (apartments, university labs, and radio and commercial studios) for electroacoustic music activities (Leite 2000). Moreover, the music studio as a cultural territory has certain distinctive qualities, such as the composer acting as a smuggler, by collecting goods in foreign lands, without paying an import tax. A similar experience happened in East Germany before the fall of the Berlin wall with "more illegal than legal means" to obtain equipment (Heidenreich 2009).

Looking from this perspective enables us to identify distinctive qualities. The appropriation

of external cultures and technologies appears in different interpretations of Brazilian culture: in the metric adaptation of African rhythms with European music, constituting the basis for bossa nova and samba (Sandroni 2001), or in the strategies to evade the military dictatorship's censorship (1964–1985) by using sarcastic and subliminal messages in pop songs (Tinhorão 1998). These aspects can be observed in: (1) the national electroacoustic music scene that incorporates notions of *gambiarra* (Obici 2014) and the low fidelity of the available technologies, or second-hand and recycled gear (Miranda 1995)—what Antunes called the "aesthetics of precariousness" (Lintz Maués 1989); (2) the emerging studios hosting critical disagreement with the dictatorship, which led to censorship and people losing their jobs in institutions; and (3) the restoration of a Latin American identity, recovering from a cultural loss observed in the Latin American Course on Contemporary Music (LAM 2022; Guerra 2012).

Gambiarra and the Aesthetics of Precariousness

Another critical perspective to consider is the understanding of *gambiarra*, which, according to Giuliano Obici (2014), is a version of DIY and hacking, specific to Brazil. An English translation for *gambiarra* would be "make do" or "workaround." Music history has many instances of DIY-hackers, such as Hugh Davis (cf. Mooney 2017), Nicolas Collins (2014), and David Tudor (cf. Driscoll and Rogalsky 2004). These are well-known examples of artists who needed to build or hack technological devices, either due to finances or, in some cases, because they could not always find solutions in commercial devices. DIY-hacking is not identical to the diverse political and economic realities worldwide, however. Obici (2014) explains:

> *Gambiarra* tends to be configured as an improvised elaboration that shows a challenge in finding solutions to an immediate problem, be it related to aspects of daily life and primary survival in the face of precarious resources. Although hacking also often have this character of adaptation, patching, and repair, *gambiarra* solutions tend to favor, apparently, rustic solutions due to adaptation and lack of materials and tools, suggesting minimal effort, a temporary solution, often without prioritizing the virtuosic craftsmanship that would be characteristic of hacking.

Experimentation, plunderphonics, remix, improvisation, live electronics, hacking, DIY, and *gambiarra* are common aspects of Brazilian electroacoustic music (Velloso et al. 2016). Antunes set up his home studio in 1961 with a theremin and a sawtooth wave generator—both made by himself—a Grundig tape recorder, and an acoustic piano (Lintz Maués 1989). Antunes had difficulties, such as purchasing tapes and other equipment. As a solution (reported in an interview with the authors in 2022), he received magnetic tapes from his friend Flávio Silva, who worked at the Alliance Française. The tapes were of music programs from the broadcaster Office de Radiodiffusion-Télévision Française (ORTF), made for broadcast in Brazil. Antunes would erase the tapes and use them for his own compositions. Some background signal from the original sound would remain after erasure, however, and Antunes deliberately incorporated that into his music. Through all these difficulties, some experimental artistic possibilities emerged, what Antunes ironically called an "aesthetics of precariousness."

Per Anders Nilsson (2018) wrote: "Another view on experiments is to regard the electroacoustic music studio as an experimental system." Experiencing the studio as an experimental space also happened with Luigi Nono when he worked at the Experimentalstudio des Südwestrundfunks (Germany) with flutist Roberto Fabbriciani. As Fabbriciani (1999) recalled, Nono used to approach experimentation as error, even chance, saying, "errors could suddenly open up other possibilities."

As an electronic music instructor in 1967 at the Instituto Villa-Lobos, Antunes was not fully aware of all technical terminologies. For instance, he did not quite understand the distinctions between the concrete and electronic approaches and used the term "magnetophonic" to refer to the music with recorded sounds and live acoustic instruments; nor did he know that his term "closed tape" was already known as a "tape loop." When he heard about *Traité des objets musicaux* by Pierre Schaeffer

(1966), he ordered a copy and translated the whole book, which became the basis of his course in Rio de Janeiro. All this *gambiarra* was part of early electroacoustic music in Brazil. There were no grand fundraising dinners, as happened with the construction of the Telharmonium, no Rockefeller Foundation, no outstanding facilities like Bell Labs or, later, with innovative companies like Moog (cf. Chadabe 1997; Gluck 2007). Mendes (1978) sums up *gambiarra*-based Brazilian music:

> In modest home studios, improvised, almost handmade, the composers of this continent have been realizing an appreciable, sensitive, expressive musical work. The limit of their resources has conditioned an aesthetic that is still directed toward contrasted, motivated, developed, and varied music.

A Critical Timeline of Electroacoustic Music Studios in Brazil

This section presents a timeline of significant topics related to the origin of electroacoustic music studios in Brazil, including but not limited to new music manifestos, studio construction, instrument design, equipment operation, creation of musical works, and organization of cultural events such as festivals and symposia. It is our view that music studios are interpreted as cultural territories.

Some initial considerations:

1. Most Brazilian composers became aware of the culture of electroacoustic music composition by travelling abroad, exchanging communication and correspondence with cultural centers, and importing audio equipment (the professional audio industry in Brazil was scarce) and other means.
2. After formal and informal training overseas, composers would return to Brazil, some becoming professors of electroacoustic music and, later, heads of their universities' music technology studios.
3. The institutionalization of electroacoustic music studios became common in universities, turning them into safe places and cultural territories (Velloso et al. 2016). This aspect had a significant impact on the field because university studios housed many composers and artistic projects. The history of electroacoustic music in Brazil is, on the other hand, also linked to the development of the DJ scene of electronic music and the recording industry (Marke 2017).
4. Finally, the military dictatorship was a difficult period for new music in general, because of the repression of freedom of speech and artistic voices.

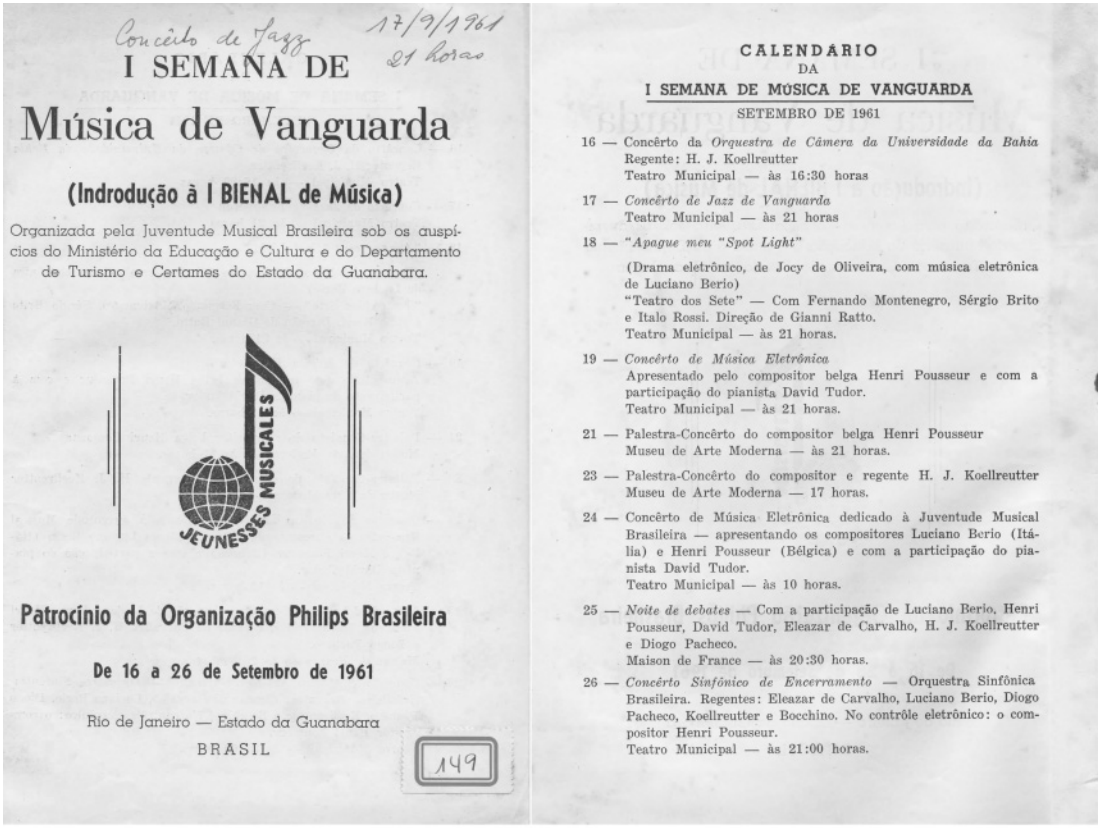
Prelude: Laying the Groundwork

1931: Brazilian poet, writer, and musicologist Mario de Andrade mentioned for the first time in a Brazilian publication the existence of the theremin as a new instrument for musical expression (Neves 1981; Ribeiro 2015). But he criticized the instrument's "fatiguing sonority" (cf. Marke 2017).

1942: Heitor Villa-Lobos founded the Conservatório Nacional de Canto Orfeônico, a school of music that later, in 1966, was renamed the Instituto Villa-Lobos (IVL). In 1967 it became the first institution to house an electroacoustic music studio.

1946: German composer Hans Joachim Koellreutter (who took Brazilian citizenship in 1948) published the "Manifesto 1946: Grupo Música Viva," a new music manifesto in Portuguese that encouraged music made with "radioelectric" instruments (Mariz 2000). Although he encouraged his students to use electroacoustic instrumentation, Koellreutter was not intensely involved with electronic music production himself. Almost 20 years after writing the manifesto, Koellreutter wrote his first electroacoustic piece, "Sunyata," in 1968 (cf. Mamedes 2010).

1956: The first Brazilian acousmatic, *musique concrète* work: "Si bemol," with a duration 1′13″, is created by Reginaldo Carvalho (cf. Silva 2015). The piece was composed in France at the experimental studio of ORTF under the supervision of Pierre Schaeffer, Luc Ferrari, and François Bayle. Although electroacoustic works were not a major part of his output, Carvalho's experience at ORTF was



(a) (b)

Figure 1. I Semana de Música de Vanguarda [Week of Avantgarde Music, 1961]: advertising poster (a) and concert program (b). (Images: Redes de Museus do Estado do Rio de Janeiro, used under Creative Commons Attribution 2.0 [CC BY 2.0].)

significant, especially when he returned to Rio de Janeiro at the Conservatório Nacional de Canto Orfeônico, where he and Antunes proposed the creation of the first electroacoustic music studio in Brazil (Lintz Maués 1989; Menezes 2009).

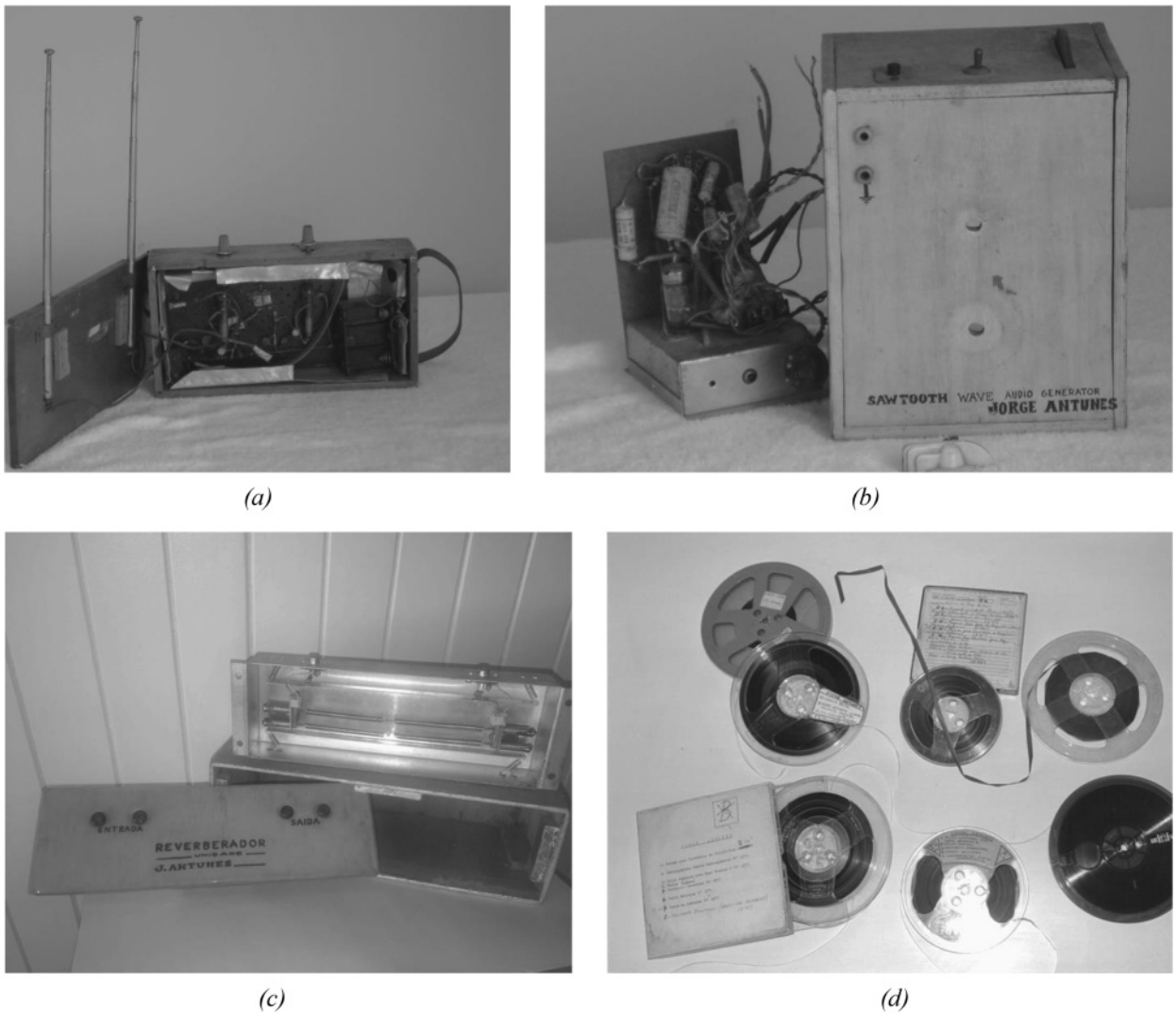
Made in Brazil: First Studios, Instrument Design, Composition Premieres

1961: The first performance of electronic music in Brazil. Jocy de Oliveira (2022) writes that her 2-hour tape composition for 18 actors and dancers, "Apague meu spot light," premiered at the I Semana de Música de Vanguarda [First Week of Avantgarde Music] in Rio de Janeiro. The piece was composed at the Studio di fonologia musicale di Radio Milano (Italy), working with Luciano Berio.

I Semana de Música de Vanguarda was organized by Jocy de Oliveira and Eleazar de Carvalho and included works by Oliveira, Henri Pousseur, Berio, and others (see Figure 1). It was the first time a Brazilian audience could hear electroacoustic music performed. Antunes was among the audience, and he recalled the impact of hearing Stockhausen's electronic music live.

1962: After the impact of I Semana de Música de Vanguarda, Antunes started experimenting with electronic music. He composed "Valsa Sideral," a piece known as the first Brazilian electronic music work (cf. Garcia 2012). Antunes knew how to build and fix simple radios. He started his private studio with a few tape recorders and some handmade electronic instruments, as shown in Figure 2 (Lintz Maués 1989; corroborated by Antunes in an interview with the authors, 2022).

Figure 2. Jorge Antunes's handmade theremin (a), a sawtooth generator (b), a spring reverb unit (c), and original tapes 1961–1968 (d). (Photos by Jorge Antunes.)



(a) (b) (c) (d)

After a quick trip to the Darmstädter Ferienkurse, Rogério Duprat opened a commercial recording studio called Estúdio Pauta, where he applied several electroacoustic music techniques to pop music arrangements.

The first edition of the Festival Música Nova, organized by Mendes, was held in Santos, São Paulo. It became one of Brazil's most important new music festivals. It still exists today, making contributions to the development of electroacoustic music.

1963: The manifesto "Música Nova" was written on 15 March 1963 and signed by Damiano Cozzella, Rogério and Régis Duprat, Sandino Hohagen, Júlio Medaglia, Mendes, Willy Correia de Oliveira, and Alexandre Pascoal. It brought a clear statement on the importance of composition based on "phono-mechanical and electroacoustics in general" (Mariz 2000).

Mendes wrote what became known as the first Brazilian "mixed" piece, combining conventional

musical performers with electroacoustic means: "Nascemorre," for choir and tape.

According to Denise Garcia (2012), Rogério Duprat and Cozzella wrote the first Brazilian computer-assisted-composition, "Klavibm II," for piano solo, using an IBM 1620 computer from the University of São Paulo (USP).

1964: A military dictatorship starts in Brazil with a coup d'état. For the next two decades (1964–1985), the population faced a dark period with political harassment, cultural censorship, and violent attacks on whomever criticized the regime. The dictatorship killed many, and hundreds more disappeared (IVH 2022). The military coup exerted a deep negative influence on the electroacoustic music scene. The regime discharged many professors, of whom some sought refuge abroad (Garcia 2012).

1966: After the University of Brasilia (UnB) was dismantled by actions of the military dictatorship, Reginaldo Carvalho opened a private studio, Estúdio de Música Experimental. He joined the faculty of the Conservatório Nacional de Canto Orfeônico (soon to be renamed Instituto Villa-Lobos) shortly after this. Canto Orfeônico soon became the first center to support electroacoustic music activities.

1967: Antunes established the Laboratório de Arte Integral at IVL in Rio de Janeiro. Antunes was generous in allowing students to share his equipment, including his the theremin and sawtooth generator. But difficulties, such as purchasing tape, persisted.

Between 1967 and 1968, Antunes started teaching electroacoustic music at the IVL. The course was called Introduction to Electronic, Concrete, and Magnetophonic Music. It was the first formal electronic music course in Brazil.

1968: The Brazilian Institutional Act No. 5 (AI-5) was one of the most radical presidential acts approved by the military dictatorship, bringing severe consequences for democracy and cultural life. It gave unlimited powers to the president at that time, Emílio Garrastazu Médici, who decided to close the National Congress. The artistic community suffered censorship, rights were revoked, and artists faced imprisonment, torture, and even murder.

1969: Antunes moved abroad in the aftermath of AI-5. This eventually led to his dismissal from IVL. Marlene Fernandes became his successor. Born in Curitiba like Jocy de Oliveira, Fernandes was a composer who recently returned from Buenos Aires after a period of studying at the Instituto Torcuato Di Tella (Garcia 2012).

Uruguayan composer Conrado Silva moved to Brasilia and worked as a faculty member at UnB. Silva began a project to build an electronic studio at the university, but this was aborted due to a lack of equipment (Lintz Maués 1989). Finally, the military regime discharged him from the university. He then moved to São Paulo, where he taught electroacoustic music courses.

1971: Silva brought one of the first synthesizers to Brazil, an EMS Synthi A. He created the group Catharsis, and he composed a number of new works, such as "Brinquedos I" (1971), "Cor Incurvatum" (1972), "Ulisses" (1973), and "Celebração para quatro coros mistos e sintetizador" (1973), using the new equipment (Kolody 2014).

Pierre Schaeffer visited Brazil as a guest speaker at the IVL (Leite 2000).

1972: The IVL was taken over by General Jayme Ribeiro da Graça, who shifted to a severely conservative approach (Garcia 2012).

1973: In an interview for *Jornal do Brasil*, Swiss composer Ernest Widmer commented on the spartan facilities in the studios, especially at the Federal University of Bahia (UFBA), where he was a professor: "We have no recorders, no synthesizer, no portable electric studio, so to speak" (cf. Lintz Maués 1989).

Antunes returned to Brazil in 1973, joining the staff of the UnB, where he established an Electroacoustic Music Laboratory (Leite 2000).

1974: In São Paulo, Silva started a school of music and studio called Travessia, later known as Travessia Oficina de Música (Souza 2014). He brought all his equipment and helped young composers through the Núcleo Música Nova, a group dedicated to contemporary music (Lintz Maués 1989). According to Anna Maria Kieffer (2014), Silva "at the time owned a Revox recorder, an AKS synthesizer [EMS Synthi VCS 3], a small mixer, microphones, and two stereo speakers."

1975: Guido Stolfi and Celso Oliveira built the first Brazilian digitally controlled synthesizer at the Polytechnic School of the University of São

Figure 3. Vânia Dantas Leite in Leo Kupper's studio in Belgium. (Photo by Daniel Puig. Source: Personal archive of Vania Dantas Letite. Public domain.)

Paulo (Palombini 2000), called the Modular Sound Synthesis System.

Luiz Roberto Oliveira gave a workshop on synthesizers and electronic music at the São Paulo Art Museum, sponsored by the São Paulo State Culture, Science and Technology Secretariat (Marke 2017).

1976: Composer Vânia Dantas Leite (see Figure 3) developed her works with a Synthi AKS that she brought from Europe. In a collaborative atmosphere, many composers in Rio de Janeiro, such as Rodolfo Caesar, worked at Leite's private studio.

At the Estúdio Travessia, now part of the Faculdade Santa Marcelina in São Paulo, Silva supported several young composers by lending them equipment. For instance, Rodolfo Coelho de Souza wrote the piece "Durações" (1976), and Wilson Sukorski composed "MEL V" (1979–1984) using Silva's tape recorders (Souza 2014; corroborated by Sukorski in an interview with the authors in 2022).

Returning to Brazil from Europe, Caesar said that Estúdio Travessia was the only place available to work in São Paulo. In Rio de Janeiro, Caesar presented an electroacoustic music series working at Rádio Globo, which owned an Electro-Compo, an ARP Odyssey synthesizer, and a few reel-to-reel tape recorders (Caesar in personal communication with the authors, 2022).

Expansion and Dissemination: Studios and Festivals Countrywide

1977: Michael Philippot invited Silva to start a new experimental electroacoustic music studio at São Paulo State University. It was the first institutional studio of its kind in Brazil (Lintz Maués 1989; Kieffer 2014; also corroborated by Sukorski in an interview with the authors in 2022). The interview with Sukorski went on to enumerate some of the equipment available, including three tape recorders (two Revox A700 and one B77), a TEAC 4-channel recorder, an ARP 2600 synthesizer, Conrado's Synthi AKS synthesizer, a mixer, reverbs, filters, and a variety of microphones.

Rio de Janeiro was the site of the First International Festival of Electroacoustic Music, taking place 5–7 July in Lage Park. It was the first festival of pure electroacoustic music in Brazil, promoted by INECOM and produced by Caesar and Sérgio and Delfina Araújo (Mannis 1994).

1978: The Seventh Latin American Course on Contemporary Music (CLAMC) in São João del-Rei, Minas Gerais. Over the years, CLAMC was held 15 times in different cities across Latin America (LAM 2022). They were a series of workshop courses committed to new music composers and performers. The first was in 1971 in Cerro del Toro, Uruguay (Paraskevaídis 2014). Silva was among the organizers of the Brazilian CLAMCs, held in 1978, 1979, 1982, 1984, and 1989. The seventh CLAMC featured electroacoustic workshops led by, among others, Silva, Leite, and Christian Clozier, and workshops on computer musical applications held by Vicente Asuar and Philippot. Two small electroacoustic studios were available.

Composer Cláudio Santoro, an influential composer in the local cultural scene, returned to Brazil from Europe, to work at UnB. He continued working on a few electroacoustic music projects in his private studio (Lintz Maués 1989).

1979: IVL becomes part of the Federal University of the State of Rio de Janeiro, UNI-RIO (Leite 2000).

The eighth CLAMC took place in São João del-Rei, Minas Gerais, featuring electroacoustic workshops by Micheline Coulombe Saint-Marcoux and Silva. Equipment made available was: two synthesizers, four tape recorders, two mixers, filters, and velocity modulators (LAM 2022).

1980: The ninth CLAMC took place in Itapira, São Paulo, featuring electroacoustic workshops by Silva and James Montgomery. Concurrently, CLAMC held the First Brazilian Symposium on Digital Music. The available equipment included a synthesizer, four tape recorders, two mixers, as well as filters, reverberators, a velocity modulator, an oscilloscope, and frequency metersbrk (LAM 2022).

1981: In Rio de Janeiro Caesar and Tim Rescala founded the Estúdio da Glória for electronic music. It was a private music studio where composers such as Caesar, Leite, Rescala, and many other worked (Menezes 2009; Mamedes 2010; Garcia 2012). Rescala and Caesar pooled their equipment to found the Estúdio da Glória. This include several tape recorders (Revox A-77 and B-77, Nagra, Akai 4000 Ds, and a TEAC four-track machine), an EMS monophonic filter, several synthesizers (a Roland modular analog system, a Yamaha DX-7) and samplers (a Casio FZ 10-M and a Roland S-330), as well as a Macintosh SE 30 (Rescala in personal communication with the authors, 2022). The Estúdio da Glória became also a commercial studio. Besides many experimental projects, they were also active in commercial productions that helped them earn a living.

Leite joined the Instituto Villa-Lobos' faculty staff to teach electroacoustic music composition (Leite 2000).

1982: The eleventh CLAMC took place in Uberlândia, Minas Gerais, featuring electroacoustic music workshops by Coriún Aharonián, José Maria Neves, and Silva. Two electroacoustic music studios were available with one synthesizer, six tape recorders, two mixers, a graphic equalizer, a reverberator, a velocity modulator, and a frequency meter (LAM 2022).

1983: Silva organized the First São Paulo Electroacoustic Music Meeting at the Mário de Andrade Library in São Paulo (Mannis 1994).

1984: The twelfth CLAMC took place in Tatuí, São Paulo, featuring electroacoustic music workshops by Philippe Ménard and Silva, using a small electroacoustic music studio (LAM 2022).

Lab Era: Electroacoustic Music Studios within Universities

1985: The military dictatorship ended, but a new constitution was not approved until 1988.

Silva composed "Grande Círculo Mágico Ritual," a work for 20 synthesizers. The premiere took place at the 18th São Paulo Art Biennial. Silva also facilitated John Cage's travels to Brazil.

Silva, Lucas Shirata (former member of Solaris, an electronic music trio), and Jorge Poulsen (an electronic engineer) began to develop Synthesis, a music technology group. Their main goal was to spread music technology. They presented the first MIDI course in Brazil (Marke 2017).

At UnB, Aluizio Arcela created the Spectral Processing Laboratory in the Computer Science Department.

1986: Composer Eduardo Bértola inaugurated the Laboratório de Composição com Meios Eletroacústicos at Federal University of Minas Gerais (UFMG). It became part of the Centro de Pesquisas em Música Contemporânea [Contemporary Music Research Center, CPMC] originally established by Koellreutter. Bértola then became its director (Palombini 2021).

Moyses Lopes Filho and Eduardo Miranda established a private laboratory for computer music research in Porto Alegre, Rio Grande do Sul, called Tupiniqarte. They owned a Saema organ, a Sinclair ZX-81, an MSX computer, as well as an external MIDI interface, built by a local engineer, modeled on the Yamaha SFG-05. Filho said "don't even think of importing: it was either do-it-yourself or copy from abroad" (Palombini 2000).

1987: Celso Aguiar, Raimundo Cavalcante, and Jamary Oliveira developed an experimental digital synthesizer, the MS-80, at UFBA, in Salvador (Palombini 2000; Aguiar 1989).

1988: Mendes invited Silva to organize a new edition of the Festival Música Nova. His participation drew particular attention to the presence of electroacoustic music at the festival.

1989: The 15th CLAMC (the last held in Brazil) took place in the city of Mendes, Rio de Janeiro, featuring electroacoustic music workshops by Wilhelm Zobl and Silva. Musical software for IBM PC and Macintosh with Victor Fuks was used. A small analog/digital electroacoustic music studio was available with a microcomputer (LAM 2022).

The Coordenação de Documentação de Música Contemporânea (CDMC-Brazil) was inaugurated on 1 September at the University of Campinas (Unicamp). This project started from an agreement signed between Unicamp and the Centre de Documentation de la Musique Contemporaine (CDMC) in Paris. Composer José Augusto Mannis was the first director of the CDMC-Brazil. Its main goal was to create a media collection that included scores, compact discs, vinyl records, books, cassette tapes, and other materials specializing in contemporary Brazilian and international new music. Today the CDMC has an essential role in the diffusion and preservation of electroacoustic music in Brazil.

1990: Wilson de Pádua Paula Filho created the Laboratory for Analysis and Synthesis of Image and Sound at UFMG (Palombini 2000).

1991: In São Paulo, composer Sílvio Ferraz started working at Flo Menezes's private studio, Studio PANaroma of Electroacoustic Music (Ferraz in personal communication with the authors, 2022). At that time, it was a studio in Menezes's apartment, but later it moved to São Paulo State University and became public.

1992: In Belo Horizonte, Minas Gerais, the Music and Computer Laboratory at UFMG was recently created under the direction of professors Gilberto Carvalho and Eduardo Campolina. This laboratory joined forces with the already-existing Composition Laboratory with Electroacoustic Media and shared their equipment (Palombini 2021).

The Sound Languages Laboratory, at Pontifical Catholic University of São Paulo, was opened that same year. It was directed by Lúcia Santaella, where she had samplers, a sequencer and, in 1994, the IRCAM and Max software (noted by Ferraz in personal communication with the authors, 2022).

The Laboratório de Música Eletroacústica, Audiovisual e Experimental (Laboratory of Music Creation, Research, and Performance, LIC-M3) was opened at UNIRIO, under the direction of Leite (2000), with support of the Research Support Foundation of the State of Rio de Janeiro.

1993: According to Eloy Fritsch (in personal communication with the authors, 2022), the Artificial Intelligence Research Group at Federal University of Rio Grande do Sul (UFRGS) created a laboratory for musical computing using the software Max.

Maurício Loureiro (2019) recalled that, with Miranda, Aluisio Arcela, and de Pádua Paula Filho, they together formed the Brazilian Group for Computer Music Research.

1994: Menezes relocated the PANaroma Studio to the public sphere of universities. According to Menezes (2009, 2022), PANaroma was modeled on the German Studio für elektronische Musik in Cologne. Multiple attempts to find a permanent home were needed for the studio. The first was at USP, then another at Faculdade Santa Marcelina, but neither lasted. Finally, PANaroma settled at São Paulo State University (UNESP). The construction of PANaroma took almost two decades, and was not finished until 2011, with financial support from the São Paulo State Research Support Foundation. The PANaroma Studio sponsored two events dedicated to electroacoustic music: the International Electroacoustic Music Contest of São Paulo, established 1995, and the International Biennial for Electroacoustic Music of São Paulo, starting one year later. PANaroma's equipment includes, beyond computers and standard audio gear, a KYMA workstation and surround sound systems with Genelec, Meyer, and Mackie monitors (cf. Menezes 2022 for further details).

There is a conflict as to who first inaugurated a studio at UNESP. Silva, in 1977, also started a studio project at the Faculdade Santa Marcelina and later at UNESP. We understand, however, that they were independent projects, since we have no information on whether Silva's studio endured. Mannis (1994) mentioned a new studio at USP under the direction of Marcos Branda Lacerda, "partially financed by an agreement with Germany." Later, it became known as Laboratory of Musical Acoustics and Informatics. It is not clear if this has any connection with Menezes's project.

Foundation of the Sociedade Brasileira de Música Eletroacústica [Brazilian Electroacoustic Music Society, SBME], was established with Antunes as main director, and included numerous distinguished composers such as Silva, Coelho de Souza, Jocy de Oliveira, Reginaldo Carvalho, and many more. The SBME would later, in 2010, release an album of five discs of Brazilian electroacoustic music.

Loureiro organized the First Brazilian Symposium of Computer and Music as part of the 14th Winter Festival at UFMG. He is now director of the CPMC, and the department facilities expanded to create the Integrated Music and Technology Laboratories with four different labs: Composition, Synthesis, and Sound Processing; Performance with Interactive Systems; Recording and Sound Reinforcement; and Theoretical Subjects.

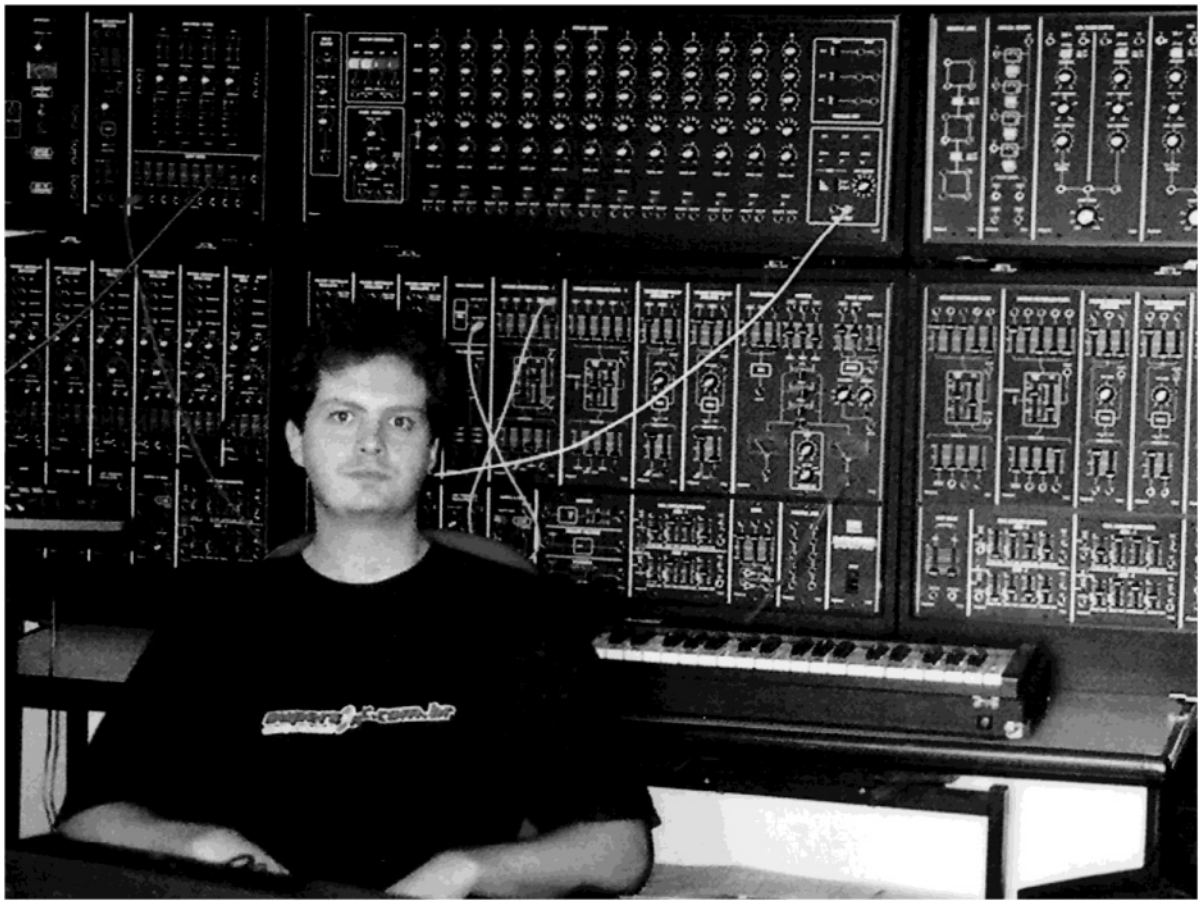
Ferraz recalled (in a communication with the authors, 2022) that he, together with Fernando Iazzetta and Guerra, started a study group in São Paulo using the software Max and Patchwork.

1995: Because of the difficult economic situation in Brazil (cf. Dal Farra 1994), Miranda (1995) published an urgent appeal to the international community in the *Computer Music Journal*: "I wonder if other advanced and wealthy institutions that are renewing their equipment would be willing to donate what is being replaced to us—provided that they still work. We also welcome updated equipment from companies that constantly release new products. We do not care, to be honest, about latest models. We care if the equipment works."

1998: Miranda released Chaosynth 1.0 through the British company Nyr Sound. This was a granular synthesis software controlled by cellular automata. Aphex Twin and Brian Eno were among the users (Marke 2017).

1999: The Center for Computational and Electronic Music (CME) in Porto Alegre, Rio Grande do Sul, was constructed. It comprised three laboratories: MIDILAB, AudioLab, and LME, and was part of the Music Department of UFRGS (see Figure 4). Much of the equipment came from Fritsch's private collection, which he had started collecting in the 1980s: Korg MS-10, Atari computer, Roland System-700, Crumar Multiman/Orchestrator –, Arbon keyboard, as well as cassette and DAT recorders, Pro Tools and Steinberg Nuendo recording software, Korg DW-8000, Korg Polysix, Korg Delta, Ensoniq MR76, and a Roland VS-1680 digital mixer. The official inauguration

Figure 4. Eloy Fritsch in the Electronic Music Center at the Arts Institute of the Federal University of Rio Grande do Sul (UFRGS), May 2002. (Photo courtesy of Eloy Fritsch. CME Image Files.)



was on 15 January 2003. (Further details available at http://www.ufrgs.br/musicaeletronica)

2000 to present: From the turn of the century we have seen a substantial increase in music studios in cities besides Rio de Janeiro and São Paulo, especially in universities. According to Fritsch (interview with authors in 2022) CME began a new project in 2005 called the UFRGS Loudspeaker Orchestra. In the state of Paraná, three laboratories were opened: in 2006 the Sound Research and Production Laboratory at the State University of Maringá; in 2012 the Laboratório de Música, Sonologia e Áudio and the Laboratório de Linguagens Sonoras e Música Eletroacústica. The latter two are at the State University of Paraná in Curitiba. This list probably does not include all electroacoustic music studios in Brazil, especially after the 1990s. We should explicitly note the Núcleo Amazônico de Pesquisa Musical at the Federal University of Acre; the GenosLab at UFBA; the Laboratório de Pesquisa Sonora at Federal University of Goiás; the Laboratório de Música e Tecnologia at the Federal University of Rio de Janeiro, Laboratório de Composição at the Federal University of Pelotas; the Laboratório de Acústica e Artes Sonoras and the Núcleo Interdisciplinar de Comunicação Sonora at Unicamp; among many others (Ribeiro 2018).

Final Considerations

Analyzing electroacoustic music through a studio perspective is a way to understand this space as cultural territory, or, in the words of Coelho de Souza

(2014), as a "fertile and effervescent environment." The studio is not just a technical space with audio gear but a center for people to exchange knowledge and experience with machines. Cipriani et al. (2004) share a similar experience: "Each time we have worked together as a group, we have learned much more than when working individually." Sharing makes a substantial impact on the process of making music through the collaborative compositional experience, manipulation of equipment, and the design of space.

A complete timeline of electroacoustic music studios is never ending, but we highlight four aspects:

1. Most writing about electroacoustic music is done by composers, such as Garcia, Guerra, or Leite, to name but a very few. In our view, it should include more musicologists, beyond Carlos Palombini, José Alexandre dos Santos Ribeiro, and Vasco Mariz. Electroacoustic music studies in Brazil are still young and lack formal support from academia, institutions, and government. Garcia (2012) wrote:

> Electroacoustic music started late in Brazil, either because of the lack of laboratories and equipment, or because of the lack of interest from radio stations and music schools.

The responsibility of preserving history fell into the hands of composers, and musicological achievements in the field are slowly professionalizing. As Aylton Escobar said (in an interview with the authors, 2022), "electroacoustic music in Latin America is still a child, an infant."

2. Homemade culture was very much present in Brazil's development of electroacoustic music: shared private studios in apartments, an overall generosity with equipment sharing, handmade instruments, *gambiarra*, and the "aesthetic of precariousness." We cannot state this culture is exclusive to Brazil. In the 1960s, Morton Subotnick's studio in New York was a shared space, even though it was part of New York University (Gluck 2012). Menezes observed that in Brazil "institutions blend with personalities." The private and the public were blurred in our history. Menezes (2014, p. 14) regrets that "when a key figure, for a certain institution, leaves, the institution usually ends up not preserving the achievements and guidelines of its founder." Studios come up as fast as they go. The difficulty of maintaining these spaces has been a constant struggle.

3. During the 1970s the military dictatorship brought conflicts with democracy, human rights, and import restrictions. Because the military brought computer technology from abroad, however, much progress occurred in the field, and electroacoustic music has benefited from this overall growth of technology (Garcia 2012). At the end of the dictatorship a law was instituted that required computers to be manufactured in Brazil, and several companies emerged, copying American systems like those of Microsoft and Apple. One of those companies, UNITRON, made good clones of the Apple II (Sukorski in interview with the authors, 2022).

4. Like other countries, gender issues have had an impact on the history of electroacoustic music in Brazil. Women composers like Jocy de Oliveira, Fernandes, and Leite have never received the same acclaims as the "barons" of concert music Camargo Guarnieri, Villa-Lobos, and Koellreutter. "Apague meu Spot Light" was the first performance of electronic music in Brazil, but it was largely "ignored until today by most Brazilians electroacoustic composers" (Oliveira 2014). Not much about composer Fernandes has survived, except for what is known through the effort of Iazzetta (2020). Leite's legacy has survived mostly through her accomplishments inside universities, similarly to what is happening to Garcia at Unicamp. Most composers in Brazil have been white men, which is unfortunate. In our view, a country with so much historical miscegenation needs to recognize gender diversity.

Today, Brazil still has difficulties with the growth of electroacoustic music projects. In the last four years of federal government under President Jair Bolsonaro, much of the cruelty of the dictatorship (harking back to the ideology of the AI-5) has returned, especially the dismantling of the Ministry of Culture. Despite these setbacks, cultural institutions remain strong, and universities continue as important shelters. The history of electroacoustic music in Brazil is also a history of resistance. We

hope that this timeline contributes to the growth of electroacoustic music scene in Latin America.

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