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RESEARCH ARTICLE

# The Global Sound Archive

Miguel A. García[1,2] and Daniela Anabel González[3]

[1]Institute of Anthropological Sciences, Faculty of Philosophy and Letters, University of Buenos Aires, Buenos Aires, Argentina; [2]National Scientific and Technical Research Council, Argentina and [3]Department of Arts, Faculty of Philosophy and Letters, University of Buenos Aires, Buenos Aires, Argentina
**Corresponding author**: Miguel A. García; Email: magarcia@conicet.gov.ar

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## Abstract

Through the concept of the global sound archive, we propose a holistic perspective to study the sound universe accessible through the Internet. This concept refers to a reservoir of extremely heterogeneous, expansive, and unstable sound fixations that include musical expressions, soundscapes, corporeal sounds, voice messages generated through instant messaging apps, podcasts, and many other sonic phenomena. In the development of the article, we describe how agents contribute to this archive, where the sound fixations it contains are hosted, and what its central attributes are. This investigation is informed by concepts of diversity, expansiveness, instability, modularity, and intermediality.[1]

**Keywords:** Global Sound Archive; Internet; Sound File; Sound fixation

## Introduction

Mostly through uncoordinated actions, various agents contribute to and restructure a globally reaching sound archive. This is a diverse and multisited reservoir that is continuously expanded and modified. It gathers digital and digitized sound

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fixations, both musical and non-musical, as well as recordings and editing registers[2] that contain a wide variety of expressions: music, soundscapes, corporeal sounds, voice messages generated through instant messaging apps, podcasts, and more. Every sound file[3] potentially accessible via the Internet, regardless of the type of device or interface used to access it, is part of this archive. Its content is decentralized, and distributed across various sites controlled by state institutions, non-governmental organizations, commercial enterprises, groups of individuals, and individuals driven by personal interests. In archival terms, the agreement among these agents is irregular, being stronger among state institutions and weaker or nonexistent between the latter and the private sector or individuals.

In this article, we address this diversity of sound fixations as a whole, under the concept of the global sound archive.[4] The heterogeneity, decentralization, and lack of a consensus on archival policy that characterize this archive necessitate prioritizing certain issues. First, what justifies treating a growing mass of sound files, which seem chaotically scattered across different sites, as a single entity? Two reasons can be presented to answer this question. On one hand, there is a pragmatic reason that arises from observing users' experiences. Users can access and utilize sound files from various sources at a single site, with a single device, and with a few procedures. This happens in such a way that within seconds, an area of the global sound archive, represented as active and minimized windows, becomes visible on the user's screen.[5] Users can navigate different sections of the archive by combining various sites and applications. Many of the actions they perform on each of these files will, in theory, constitute a global change that may or may not be available to other users who access it simultaneously or sequentially. On the other hand, a heuristic reason can be presented regarding terminology and the questions raised by the perspective we are proposing. Considering a highly heterogeneous set as a whole, almost compulsively leads to a more careful observation of similarities and differences. This process has implications: it prompts a review and refinement of the terminology needed to describe the phenomenon and generates questions that do not arise when dealing with a homogeneous set of sound fixations. By studying a reservoir that contains expressions as diverse as songs, voice

[2] In a previous article (García and González 2024), we defined these concepts in detail. In brief, sound fixations encompass both sound recordings and editing registers. Sound recordings capture sound events—such as musical performances, bird songs, conversations, and soundscapes—unfolding linearly over time. Editing registers consist of sound editing made through digital means, such as the accompaniment of a song created using specific software.

[3] In this text, the expression "sound file" refers to the digital encoding of the sound recording.

[4] The term "global sound archive" has been previously used by Noémie Fargier (2020) to refer to collaborative sound maps created using Google Earth. As will be demonstrated in the development of this article, the meaning we give to this term differs completely from that assigned by Fargier.

[5] The number of windows that can be kept open simultaneously, whether active or minimized, depends on the operating system, the hardware of the device being used—such as available memory and storage—and the resources demanded by the open applications or websites. While word processing programs consume relatively few, audio or video editing software requires more than double that quantity. In the case of the Windows operating system, for example, the theoretical number of windows that can be opened simultaneously ranges between 10,000 and 20,000, depending on the version in use. For browsers like Google Chrome, there is no limit to the number of active tabs. Again, the actual possibilities depend on the hardware, particularly RAM and CPU capacity.

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messages, sounds for digital instruments, bird calls, underwater sound recordings, voices of social protests, and perhaps every existing sound phenomenon as a whole, a novel and challenging range of questions emerges: What agents contribute to the global sound archive? Where are all its sound files stored? What are their general attributes? How can the sound fixations contained in the sound files be named and classified? For what purposes are these fixations created? What are their uses?—among others. That is to say, we believe that the concept of the global sound archive is doubly fruitful: it encompasses the user's perspective and provides a heuristic advantage over partial approaches to the phenomenon, such as limiting observation to one or several streaming platforms.

The second question to address concerns the concept of archive: Why use it to refer to the random and sometimes ephemeral outcomes of actions by agents whose purposes can occasionally be antagonistic?[6] The answer is simple: there is no other term free from ambiguities and contradictions that can replace it. That said, we believe that the global sound archive is constituted through archival practices such as storage, preservation, curation, the implementation of accessibility policies, dissemination, and more. These practices come from physical and digital environments but are developed in the virtual environment using specific tools and devices. Additionally, end users also have specific tools to find what they are looking for, which to some extent compensate for the disorder caused by decentralization and the lack of consensus among the agents that make up the archive. Some of these tools are hyperlinks, resource locators (URLs), browsers, tagging, digital footprints, or unique and permanent identifiers (such as DOIs), and others. In summary, we consider the concept of an archive to be appropriate for naming and elucidating what lies beyond the door opened by the Internet, because part of the old physical archive and its archival practices are present there, transformed to align with the virtual nature of the environment and the emergence of new roles and actors.

The main objective of this article is to describe the global sound archive and, around it, expand the research agenda concerning the storage, distribution, and use of sound in the changing world of networks and virtuality. To fulfil this purpose, we delve into the description and analysis of who contributes, and how, to the global sound archive, where and by what means its contents are stored, and what its general attributes are—diversity, expansiveness, instability, modularity, and intermediality. All these aspects navigate a changing environment in terms of technology, distribution, and usage, which makes them subjects of constant reconsideration. What follows is an analysis of a moment in the course of what we call "the global sound archive."

## Who feeds it?

As it was said, various agents uninterruptedly feed and restructure the global sound archive. Among them are public institutions, non-governmental organizations, commercial companies, groups of individuals joined around common goals, and

[6] A critical stance regarding the use of the term "archive" to describe the sound universe of this environment is encapsulated in the concept of "anarchive" (Ernst 2002 and 2006), which highlights a disjunction between the archival aspiration for order, coherence, and the revealed origin of documents, and the disorder, fragmentation, and multiplicity of information in the virtual environment.

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individuals driven by personal interests. Through the Internet, all of these intervene in the global sound archive by uploading, downloading, modifying, disaggregating, and aggregating sound files, as well as associating and dissociating these files with images—both still and moving—and metadata, implementing different accessibility strategies that range from open to restricted access. The heterogeneity of the agents contributing to the existence of the archive, reflected in a wide array of goals and policies, is mirrored in the heterogeneity of the archive's very structure. Subject to constant reconfigurations by institutions and individuals, the actions of all these agents take place in an environment of persistent technological transformations governed by overlapping regulations that often conflict with unforeseen uses and various piracy practices.

**Public institutions**, promoters of open access and driven by goals of preservation, cultural demarcation, the exercise of memory, or simply the dissemination of the expressions contained in their sound repositories—both published and unpublished—often contribute to the global sound archive by putting online sound fixations generated by research projects and the work of collectors, gatherers, and documentarians. Their contributions to the global archive can have a national character[7] or extend beyond their borders.[8] In some cases, the sound fixations they exhibit reveal that they were created under Eurocentric or colonial policies.[9] An area mostly covered by public institutions corresponds to the sound dimensions of urban and rural ecosystems. Paradigmatic examples of such contributions include the sound legacy of R. Murray Schafer and the World Soundscape Project, hosted at Simon Fraser University under the care of Barry Truax,[10] as well as the Atlas project at Montana State University,[11] which collects over 3,000 files of sounds from amphibians, birds, invertebrates, mammals, reptiles, and environments. Another area to which public institutions often contribute is the documentation of oral genres, such as the *Repositorio del Laboratorio Nacional de Materiales Orales de la Universidad Nacional Autónoma de México*, which aims to gather oral expressions from all languages spoken in Mexico.[12]

**Non-Governmental Organizations**, devoted to open access just like public institutions, constitute the most normative vector of the global sound archive. Their presence stands out through the promulgation and recommendation of international standards related to the storage, preservation, and access to sound fixations. A milestone in this regulation is represented by the so-called FAIR

[7] See, for example, the sound recordings included in the *Catálogo Digital del Instituto Nacional de Musicología Carlos Vega de Argentina.* https://coleccion.inmcv.gob.ar/index.php/Detail/series/3

[8] See, for example, the online catalogue of the *Centre de Recherche en Ethnomusicologie* (CNRS). https://archives.crem-cnrs.fr/

[9] See, for example, the recordings housed in Lautarchiv Berlin, made for linguistic and cultural purposes by the *Königlich Preußische Phonographische Kommission* with prisoners from World War I (1915/1918). https://www.lautarchiv.hu-berlin.de/collections-and-catalog/examples/phonographic-commission-war-poem/. Regarding colonial-era collections housed in Germany, see Hilden, Mahazi, and Kalibani (2022).

[10] https://www.sfu.ca/sonic-studio/WSPDatabase/

[11] https://acousticatlas.org/index.php

[12] https://lanmo.unam.mx

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principles—findability, accessibility, interoperability, and reuse—[13] adopted by the European Data Protection Regulation in 2018[14] to optimize data use (Wilkinson et al. 2016). Some of these organizations, particularly those with global influence, tend to operate with inclusive policies that tend to implement inclusive policies that address inequalities in access to information and cultural goods. Additionally, some of them promote interoperability and the centralization of sound collections. A paradigmatic case is an initiative called Internet Archive,[15] which aims to "provide universal access to all knowledge" by storing websites, books, texts, videos, images, software programs, and sound fixations. At the time of consultation, the Internet Archive houses 15 million sound fixations. Equally paradigmatic is the Europeana program,[16] funded by the European Union, whose mission is to seek, preserve, and share "art, books, films, and music from thousands of cultural institutions" belonging to the European digital heritage. Europeana provides access, at the time of consultation, to 50 million items, of which 601,000 belong to the category "music"—sound fixations and other content. The regulatory aspects and the pursuit of collaborative and centralized strategies in the creation of sound and multimedia archives are reflected in the creation of Telemeta, a Media Asset Management system designed primarily for ethnomusicological collections that offer tools "to archive, backup, transcode, analyse, annotate, and publish any digitized video or audio file with extensive metadata [...] through a smart and secure platform, in accordance with open web standards."[17]

A wide variety of **commercial companies** contributes substantial quantities of sound fixations to the global archive. Several sources[18] estimate that in 2023, around 43 million sound fixations were uploaded, averaging 120,000 items per day. Among the largest contributors are music marketing platforms, which control different levels of the market through a system referred to as the platform ecosystem (Van Dijck 2020). A notable example, not only for the quantity but also for the diversity of sound fixations it hosts, is the platform YouTube[19], which serves as a sort of metonymy for the global sound archive. The contribution from companies that market non-musical recordings, such as foley sounds, sound libraries for editing programs, sound banks for virtual instruments, and music for various types of media productions, is also significant.[20] All these companies

[13] See *Turning FAIR into reality* (2018).

[14] https://gdpr-info.eu/

[15] https://archive.org

[16] https://www.europeana.eu

[17] https://parisson.github.io/Telemeta//

[18] Among them, Luminate. Estadísticas sobre consumo 2023. https://luminatedata.com/reports/yearend-music-industry-report/

[19] According to the research by Liikkanen and Salovaara (2015) on the circulation and consumption of music on YouTube between 2008 and 2014, music represented the highest percentage of searches and plays on the platform. Furthermore, a preliminary analysis of the influence of YouTube's recommendation algorithm on music consumption patterns, as well as on how musical content is classified and grouped on the platform, can be found in the study by Airoldi, Beraldo, and Gandini (2016).

[20] See, for example, https://freemusicarchive.org/home

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manage to commodify both sound and the data they acquire from distribution. Their revenues come from selling advertising space and consumer behaviour information or charging for access to streaming and download services. The involvement of some of these companies in shaping the global sound archive enhances its decentralized character, similar to other agents, but their uniqueness lies in the emergence of areas of restricted access.

In addition to public institutions and private companies, there are numerous **networks of individuals** who, united by a common goal and often in dissent with the commercialization policies of music distribution companies, manage websites featuring sound fixations and other types of digital content. These groups can be self-managed or supported through financial backing from public institutions and non-governmental organizations, advertising, or voluntary contributions from their followers. Generally accessible, the sites run by these groups centre around specific purposes, such as advocating for a particular community,[21] preserving or sustaining a specific sound heritage,[22] promoting a music genre,[23] providing free access,[24] and so forth. Although their permanency varies significantly from one to another, they often represent the most ephemeral segments of the global sound archive. A particular case of such groups consists of those who explicitly advocate for open access, open code, and the privacy of individuals, and who disagree with restrictive proprietary licenses. Their efforts have led to developments like Nuclear,[25] a free, open-source web application[26] without advertising that does not collect data or apply telemetry,[27] and is available for Linux, Windows, and MacOS. With a simple interface similar to those of commercial streaming platforms, this application provides access to both sound fixations and metadata from various sources like SoundCloud, YouTube, and BandCamp, while allowing—through the installation of different plugins—the addition of more sources.[28] Another example of this type of development is Despotify,[29] an unofficial, free, and open-source Spotify client without a graphical interface that allows quick connection to Spotify through a command-line interface. This was produced by a group of anonymous programmers who, after extensive reverse engineering,

[21] See, for example, https://www.archivosonoromapuche.cl

[22] See, for example, https://www.archivodemusicaoriginal.com

[23] See, for example, https://www.todotango.com

[24] See, for example, https://pixabay.com/es/music/search/genre/pop%20indie/

[25] https://nuclear.js.org/

[26] There are also mobile music streaming applications that are free and ad-free. One of the most used —available only for Android—is RiMusic (https://rimusic.xyz/), which allows access to the complete catalog of YouTube Music. Another such application—widely popular for about 4 years and currently discontinued due to legal conflicts with Google—is YT Vanced.

[27] It can be read on their website: "Say goodbye to proprietary music players filled with ads, tracking, and profiling. Nuclear empowers you to listen to what you want, where you want, and how you want, for free."

[28] Another application with similar features is Fildo (https://fildo.net/android/en/), which also retrieves music from various online sources. However, unlike Nuclear, it does not guarantee the absence of ads or data privacy.

[29] http://www.despotify.se/

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managed to clone Spotify's code. Given their characteristics, such applications tend to be particularly unstable.

In addition to individuals guided by the aims of institutions, companies, and organizations, there are others who operate within the global archive driven by their own interests—such as those who upload their podcasts to platforms. In theory, these individuals navigate much of the surface of the archive—both open and restricted access—and have access to a full range of technical operations that can be performed on a sound file, including uploading, downloading, editing, compressing, disaggregating, and so forth. They contribute to the global archive with an immense variety of fixations—once again, the heterogeneity found on YouTube can serve as an example. In terms of consumption, the type of individual we are referring to is often depicted by using the term "prosumer." This concept highlights the fact that their actions involve both the creation and aggregation of content as well as the use of previously created one. Prosumers form a highly heterogeneous group in terms of expertise: some may interact with the web using only basic skills, such as searching for, accessing, and playing a file, while others possess more advanced abilities that allow them to create and edit sound, generate multimedia products, hack a site, crack a program, and so forth. A singular contribution from individuals to the global sound archive comes from the production of voice messages using instant messaging applications for smartphones, such as WhatsApp, Telegram, and others. The massiveness of these everyday sound recordings, primarily restricted to private contexts, continually enriches the global archive with sonic materializations of language that express a wide variety of topics, styles, and emotional expressions—commonly referred to as voice messages.

As stated, the global sound archive is the result of the actions of various agents who operate as uncoordinated—or partially coordinated—aggregators and modifiers, not all of whom are aware that their partial contributions are building a globally reaching archive. In theory, they all act as prosumers because, in addition to enriching the archive with sound fixations, they dynamize it through actions such as replicating, transforming, aggregating, and disaggregating files, as well as associating and dissociating them from images and metadata, among other actions. Although we have delineated five types of agents—public institutions, non-governmental organizations, commercial enterprises, groups of individuals, and individuals—in practice, their particularities often blur, mask, or overlap. For example, consider the hypothetical case of a judge who, in the context of a legal process, listens to, downloads, or replicates a sound file that contains a recording of a wiretap. The judge may listen to and manipulate that recording either on behalf of the judicial institution or in a personal capacity driven by curiosity or some form of morbid satisfaction. We can also imagine the case of an employee at a record label who manipulates recordings according to the directives of the company that employs them—the recording as a commodity—while simultaneously or successively carrying out that task guided by their own aesthetic and emotional inclinations—the recording as an object of contemplation. A final case that can be cited to relativize the distinction between the agents we have made is YouTube, where we see individuals operating in their own name while also contributing to the resources of a commercial enterprise

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that turns those individuals into consumers of its content. This situation is also reflected, as noted by Fargier (2020), in sound maps designed by utilizing Google Earth, which are enriched by sound fixations made by contributors who receive no compensation for their efforts.

However, to some extent, these ambiguities or juxtapositions can be resolved by momentarily invoking an aspect of Latourian theory and considering all these agents in terms of "actants" (Akrich and Latour 1992), meaning as agents that generate action on the archive and possess a set of specific competencies, regardless of whether the forms they take or the aspects they present correspond to institutions, companies, or individuals.

## Where is it hosted?

The sound fixations accessible through the Internet, which we access daily and immediately from multiple devices, are stored in data centres,[30] that is, physical locations or spaces—buildings, rooms, containers, etc.—distributed around the world[31], equipped with specific IT infrastructure that consists of a set or cluster of computers organized in racks and connected both internally (local) and externally;[32] environmental controllers that rigorously and permanently regulate humidity and temperature—among other factors—; and operational software that ensures the stability of data flow—dynamic load balancing—,[33] especially in high-demand situations, and resolves potential errors or failures during data recovery.

This overall structure takes on specific characteristics and dimensions in the case of commercial companies like YouTube, which host and provide access to an immense quantity of sound fixations, always associated with images, whether static or in motion. With an average of 400 hours of video uploaded per minute, 4 million videos uploaded per day, and over a million hours of video played daily,[34] this streaming platform requires particularly powerful, fast, and complex infrastructure. Since 2006, when Google acquired the company, YouTube has stored its data in what is known as Google Modular Data Centres, which consist of portable data centres built inside containers, featuring advanced technology, and easily

[30] Although the term "servers" is often used synonymously, it is important to distinguish that data centres are larger in scale, have more powerful infrastructure, and generally contain multiple servers. This is so because, while servers can execute a single "computing node", data centres can run numerous nodes simultaneously, giving them a much greater operational capacity.

[31] Ironically, the musicologist Nicholas Cook, referring to the storage and distribution of music, states "the data are still held on physical devices, but these are relegated to server farms: *out of sight, out of mind*, rather like the mass export of European and American waste to India and China" (Cook 2019: 7). The emphasis is ours.

[32] This part of the hardware infrastructure can be further divided into servers—either modular or rack-mounted—and storage devices proper, such as hard drives or solid-state drives.

[33] See, for example, Adhikari, Jain, Chen, and Zhang (2011) or Torres et al. (2011).

[34] In addition to storing and distributing videos, YouTube also continuously collects massive quantities of data—which is referred to as big data—about its users, primarily related to their interests and consumption patterns—such as preferred videos, watch time, likes, comments, etc. (see, e.g., Finamore et al. 2011 or Snickars and Vonderau 2009).

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relocated according to demand. While precise information is not available on how many of these modules are exclusively dedicated to storing and distributing YouTube content, or their specific geolocations, Google provides a list of its data centres located in various cities across Latin America, Europe, Asia, and the United States.[35] In addition to having modular data centres distributed around the world, YouTube utilizes a Content Distribution Network (CDN), which consists of an overlay network of computers—a set of servers[36]—with copies of a significant volume of videos, particularly the most popular or most viewed ones. Through this data redundancy, users are guaranteed almost immediate access to information while protecting the data against potential hardware failures or communication issues. Moreover, each time a user accesses a video, YouTube analyses where in the world that interaction is taking place,[37] which server in the CDN is closest, and how busy it is at that moment, in order to redirect the request as quickly and efficiently as possible to the desired content. This way, it avoids delays or failures due to potential server overloads and slows down hardware wear.

With coverage in 184 countries and over 610 million active users, of which nearly 240 million are subscribers to paid services, Spotify is another music streaming platform with significant influence in shaping the global sound archive. For approximately a decade—from its founding in 2006 and subsequent launch in 2008—Spotify stored its content in four proprietary data centres, with around 5,000 servers, located in Europe (Stockholm and London) and the United States (Ashburn and San Jose). In early 2016, the company began a complex process of migrating data and services to Google Cloud Platform, which led to the closure of its data centres in late 2017 and early 2018. While it is not known precisely where in Google's complex and powerful infrastructure Spotify's content is stored, it is likely that the overall architecture and distribution network are similar to those of YouTube. Although YouTube and Spotify are not the only commercial music companies contributing to the global sound archive, the way they store, protect, and retrieve the immense quantity of sound fixations they make available to users on any device and with just a click can be considered paradigmatic.

In addition to these large companies, public institutions, and Non-Governmental Organizations also store, preserve, and provide access to a vast volume of sound fixations. While the architecture and IT infrastructure that ensure their storage and retrieval are generally the same, their scale can vary significantly. This will depend on factors such as the type of institution—whether it is a national or provincial

[35] https://www.google.com/about/datacenters/locations/

This information can also be reviewed at: https://en.wikipedia.org/wiki/Google_data_centers

A tentative map of the geographical distribution of YouTube's CDN servers, created from reverse engineering by a group of researchers from the Department of Computer Science and Engineering at the University of Minnesota, can be found in "Vivisecting YouTube: An Active Measurement Study" (Adhikari, Jain, Chen, and Zhang, 2011).

[36] In some studies, also referred to as cache servers (Adhikari, Jain, Chen, and Zhang, 2011; Finamore et al., 2011).

[37] Adhikari, Jain, Chen, and Zhang (2011) found that YouTube geolocates users' video requests—a strategy they refer to as "locality-aware DNS resolution"—to respond regionally to those requests.

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archive, or an NGO with international or regional reach—the country in which it is located, it's budget and sources of funding—whether it comes from the national government, donations, contributions from private members, etc.—the rigor and consistency of the digitization and document management processes, the types of preservation policies and their systematic application, the material structure—physical spaces, devices, service networks, specialized personnel, etc.—and the characteristics and quantity of the files, among other factors. As a result of this diversity, it is possible to find institutions with their own local servers, those using private cloud storage services, or public clouds like Google Drive or Dropbox, those that systematically back up files on external storage devices, those with data redundancy systems in one or more remote locations to ensure the preservation of files against potential local technical failures, or, conversely, those that have no backup system at all.[38] Considering all this, the stability, integrity, and persistence of the content that each specific institution contributes to the global sound archive can vary significantly and be potentially unstable.

Finally, it is important to highlight that we, as individuals, also contribute to the formation and transformation of the global sound archive with our personal devices. Sending audio messages through instant messaging apps—such as WhatsApp and Telegram—, creating videos often accompanied by music—whether to document an event, remember a choreographic sequence, participate in a social media challenge, or share a daily exercise routine—or simply replicating songs on social media, playlists, or videos from streaming platforms—using the share or copy link options—are just some of the actions through which we daily modify this vast reservoir of sound. Considering this, mobile devices and personal computers become storage units that, despite their limited capacity, potential fragility, and volatility, gather a variety of content that can offer unique individual perspectives and memories to the global sound archive.[39]

[38] The terms *public* and *private cloud* are used in the field of computing to differentiate between two types of cloud storage services. The so-called *public clouds* are available to the general public, institutions, and businesses, typically for a fee that varies on the basis of the required storage capacity —though many of them offer free versions. The management and maintenance of the IT infrastructure are handled by the service providers, and users only need internet access to use the service. Public clouds do not provide information about where data is stored, how often backups are made, or which the privacy strategies in place are. *Private clouds*, on the other hand, have an infrastructure designed for a single institution or company; only authorized members—both internal and external—can access the cloud, and in many cases, the data centres where the information is stored are built and hosted on the client's premises. This type of service prioritizes security, data control, and privacy. For further details on the scope, benefits, and challenges of these cloud infrastructures, see: Solanke Vikas et al. (2013) and Sumit Goyal (2014).

[39] A sharp reflection on the relationship between digital communication technologies and the construction of individual and collective memory can be found in José van Dijck's book *Mediated Memories in the Digital Age* (2007). The author questions how ubiquitous media technologies shape memory and individual recollections, and how they affect the relationship between the private and the public. In search of answers to these questions, she formulates the concept of mediated memories, which designates "the activities and objects that we produce and appropriate through communication media technologies, to create and recreate a sense of our past, present, and future in relation to others" (21).

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## What are its attributes?

Diversity, expansiveness, instability, modularity, and intermediality are some of the main attributes of the global sound archive. Its content is extremely diverse in more than one sense. On one hand, it brings together a set of so heterogeneous sound fixations that at times it suggests the fantasy that the entire audible sound universe is present there. On the other hand, diversity manifests itself in the units that make up the archive, as evidenced by the fact that a single sound file is often replicated in different places and can have various audio compressions, metadata, tags, access types, and so forth. Furthermore, diversity takes on an irregular aspect across the entire surface of the archive, with areas of high diversity, such as YouTube, and others of low diversity, like a sound library for music editing or any other specialized site. However, users can maximize that diversity on their device screens, as there are no technological restrictions preventing them from gathering an extremely eclectic set of sound fixations.

Expansiveness also manifests itself in various dimensions of the archive. On one hand, as mentioned, the mass of sound files that make it up increases day by day due to the actions of all the agents operating within it. This growth stems from several motivations: the music industry's drive to expand its profits by providing users with as many commodities as possible—songs, in the terms of major streaming platforms—the intention of institutions to make their sound heritage accessible, and the substantial generation of voice messages. On the other hand, this increase coincides with a rise in the number of users, websites, and data centres, as well as with the continuous optimizations being made in the performance of storage and distribution hardware and software.

The global sound archive is also unstable, as files and websites often disappear from it or access to them becomes restricted. The reasons for this are varied: technical failures, voluntary closures of websites, artists' political decisions to remove their songs from platforms,[40] legal shutdowns of illegal pages, commercial or ideological decisions to restrict access in certain countries or for specific types of users, and so forth. However, instability has its counterpart: what disappears from the network is likely to be stored in a user's memory, potentially available to rejoin the archive.

Modularity is one of the most significant attributes of the environment and components of the archive. Lev Manovich highlighted the importance of the modular nature of what he calls "new media" (2005). The term modularity refers to the property that certain elements of a system have to change position without, at least theoretically, altering their specific characteristics. This term applies to both hardware and software as well as digital objects. One of the main attributes of a sound file in the digital environment is its modularity, which grants it high versatility to be aggregated and disaggregated,[41] to navigate

[40] It is well known that several artists decided to withdraw their catalogs from Spotify in protest against the spread of anti-vaccine propaganda that occurred during the Covid pandemic (2022). However, shortly thereafter, in most cases, they succumbed to the temptation of the market and reversed their positions.

[41] For a more detailed exploration of the dynamics of aggregation and disaggregation, see García 2024.

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between online and offline environments, to replicate, and, in conjunction with the interoperability of platforms and devices, to move along both axes, those of succession and simultaneity. The audio compression format MPE is one of the technological developments that has enabled the modularity of the global sound archive. Due to its low storage requirements and high compatibility, it represents the triumph of distribution (Sterne, 2012) and has made the modular use of files possible for users from different corners of the world.

Through concepts such as cross-fertilization (McLuhan 1964), remediation (Bolter and Grusin 2000), intermediality (Rajewsky 2020 [2005], among others), and hybridization (Manovich 2012)[42], the emergence of digital objects resulting from the articulation of two or more "media"[43] has been highlighted. The global sound archive has an intermedial texture in several aspects. The sound it contains is often associated with image and speech, and also participates in the fusion of genres, styles, communicative purposes, emotions, and feelings through the combination of devices and applications created for specific uses. Platforms like YouTube, TikTok, and Instagram offer a wide range of intermedial productions with sound. Examples of these include the videos of Argentine image designer Gabriel Lucero, hosted on the YouTube channel known as *Gente Rota.*[44] Lucero creates animated videos of a comedic nature using real voice messages, whose meanings are satirized or parodied through the gestures, body language, appearance, and movement of his characters.

## A passage to abundance, by way of conclusion

For those interested in sound—fans, artists, technicians, archivists, researchers, etc.—the global sound archive is a unique phenomenon in history, a rapid, uncontrolled, and unpredictable passage to abundance. This may not be surprising

[42] In a chapter examining the scope and limitations of these concepts as applied to music, Haworth and Born (2022) analyze five internet-mediated musical genres —microsound, hauntology, hypnagogic pop, chillwave, and vaporwave—with the aim of challenging media and communication theories. They argue that these perspectives often overemphasize the convergence and integration of media within the virtual environment, leading to the portrayal of online musical practices as unified and coherent. Through their analysis, they seek to: reveal how the unique characteristics of converging media within each genre foster affective and aesthetic practices; explore the complex relationships between media, formats, and platforms, which may manifest as juxtaposition, contiguity, contradiction, or integration; shift the focus from questions of "meaning" to material-aesthetic dimensions; question the rigid division between producers and consumers; problematize the unity of artwork; and highlight the non-linear relationships between sounds, discourses, and social interactions that shape each genre. To address these phenomena, they introduce the concept of intermedial intertextuality, which underscore, as Born notes in the Introduction of the book, "the ways in which old and new media/platforms/formats participate in the assemblage not as tabula rasa but (again) drenched in cultural-historical associations ripe to be ironised, parodied or détourned" (Born 2022: 37).

[43] The quotation marks are intended to indicate that the meaning of the concept of "media" differs from one author to another, and few of them manage to provide a single definition within their own works. For obvious reasons, this is not the place to resolve those discrepancies.

[44] https://www.youtube.com/@Genterota

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to "virtual natives,"[45] who have socialized around networks, platforms, metaverses, avatars, bots, and all forms of technology-mediated interaction and exchange. In contrast, it may seem astonishing to "virtual immigrants," those who were socialized before the emergence of the Internet and the accompanying technological developments. The difference in perspective between the two groups is significant: for the former, the global sound archive is taken for granted, while for the latter, it belongs to the realm of the extraordinary.

In this article, we have sought to emphasize the archive's extraordinary nature by imbuing the expression "global sound archive" with a dual semantic meaning. On one hand, we have assigned it a purely referential value, as it indicates both the existence of an event—a partial and temporary configuration of the global sound archive—that becomes present to people's awareness through the screens of their devices—"I can see a multitude of available sounds"—and the interventions that people produce regarding the event—"I can upload my song to YouTube." In this sense, the expression clearly demonstrates a phenomenological value. The "discovery" of this phenomenon has resulted from positioning ourselves as end users, particularly as Web surfers determined to map, measure, and, above all, understand how the sound reservoir that the Internet opens up to us operates.

On the other hand, the expression "global sound archive" reflects a theoretical-methodological perspective that aims to highlight and test a specific construction of the object of study and analysis. This approach stems from a holistic conception of the phenomenon, emphasizing its global reach, non-coordinated collective nature, heterogeneous texture, and expansive tendency. This starting point, as we have mentioned, raises some novel questions, which emerge when bringing together under a single inquiry such disparate expressions as a sonata and a voice message, the recording of a sound event and an instrumental accompaniment produced entirely by computational means, or a sound created to disturb and a song intended to soothe, among many others. We have only addressed a few of the questions arising from these seemingly discordant conjunctions, specifically those related to who feeds and modifies the global sound archive, where the digital objects comprising it are stored, and what their main attributes are. Ultimately, the answers to these questions contribute to describing what the global sound archive is, how it functions, and how it can be approached. Deliberately excluded from the analysis are other equally relevant issues, such as users' access to the archive in question. Access presents a complexity that cannot be captured by dichotomies like restricted/open or free/paid, as it depends not only on a wide range of institutional, corporate, and personal policies but also on legal—and illegal frameworks such as piracy—technological availability—hardware and software—connectivity, users' roles, etc.

[45] We have intentionally replaced the adjective "digital" with "virtual" to emphasize that, at least in the field of sound distribution and usage, the last radical transformation was not the shift from analogue to digital—referred to in its most abstract form as "digitality"—but rather the emergence of networks and the accompanying restructuring of musical practices around data, software, platforms, and algorithms.

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One of the purposes we pursue with this and other articles (García and González 2024) is to expand the research agenda on topics related to the distribution and use of sound in the virtual environment. At various points in the development of the previous pages, we have attempted to make this contribution evident. It should be made clear that this perspective is complementary to others, including those that present a broad comparative profile (e.g., Beer and Barrows 2013) or a more focused one (e.g., Hesmondhalgh, Jones, and Rauh 2019), those that explore systemic approaches, such as Van Dijck (2020), who uses the metaphor of a tree to explain what he calls the platform ecosystem, as well as a wide variety of works that delve into the detailed analysis of specific websites. It is precisely the dialogue and complementarity among works of very different orientations that can keep the research agenda in constant flux.

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**Miguel A. García** has a PhD degree in Anthropology from the University of Buenos Aires. He works as Principal Researcher of the National Scientific and Technical Research Council (Argentina). He is Director and Editor of *El oído pensante*. He has been President of the Argentine Association of Musicology and a member of the Executive Committee of the International Council for Traditions of Music and Dance. Latest book published is *Los archivos de las (etno)musicologías. Reflexiones sobre sus usos, sentidos y condición virtual* (editor, 2023, Berlin). His research areas are: the theory and epistemology of the sound archive, the sound universe of the Internet and the musical practices of the native peoples of Chaco and Tierra del Fuego.

**Daniela A. González** obtained a PhD degree in Arts History and Theory from the University of Buenos Aires, with the dissertation "A Reconstruction of Buenos Aires Popular Music Scene between the Late 19th and Early 20th Century". She completed a postdoctoral degree with a scholarship from the National Scientific and Technical Research Council (Argentina). Currently, she holds a Teaching Assistant position at a subject named Anthropology of Music at the University of Buenos Aires, and works in the edition of the Argentinian journal El oído pensante.

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