

A History of the Audience as a Speaker Array

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ABSTRACT

Distributed music as a performance practice has seen significant growth over the past decade. This paper surveys the development of the genre, documenting important precedents, peripheral influences, and core works. We additionally discuss common modes of implementation in the genre and contrast these approaches and their motivations.

Author Keywords

Audience Participation, Distributed Music, Mobile Music, Network Music, Web Audio, Jose Maceda

ACM Classification

See H.5.5 [Information Interfaces and Presentation] Sound and Music Computing—Methodologies and Techniques H.5.3 [Information Interfaces and Presentation] Group and Organization Interfaces—Collaborative Computing, C.2.4 [Computer Communication Networks] Distributed Systems.

1. INTRODUCTION

"Announcers at every modern-day concert command us to turn off our cell phones, but what Cagean aesthetic possibilities might we discover in leaving them on?"

So rings Golan Levin in the artist's statement for *Dialtones: A Telesymphony* (2001) [11], a foundational composition in the emerging genre of **distributed music**: music that performs an audience's electronic devices as a unified instrument or invites their participation as an impromptu electronic ensemble. This is a question that he and others have begun to answer through dozens of performances and compositions worldwide, in a variety of modes and models, but all originating from a common condition: the average concert hall now contains hundreds of latent speakers, residing in the pockets of virtually every audience member.

Yet this performance genre lacks a collected history; most existing overviews list only a few works, and do not give a comprehensive image of the emergence of the genre. While mobile, networked, and social computing have defined the last decade, the history of this genre precedes the smartphone, with roots stretching back over 40 years. In this survey, we look closely at two foundational works in the

genre—Jose Maceda's *Ugnayan* (1974) and Golan Levin et al's *Dialtones: A Telesymphony* (2001)—and additionally document over a dozen performances which contributed to the genre between 1990 and 2016.

1.1 Ingredients for a Genre

The projection of music from within an audience can be found in many traditional formats, such as the church in which the whole audience sings, or the drum circle in which every listener participates. The current refocusing on audience involvement occurs at the confluence of several 20th century developments: electronic broadcast technologies provide new modes of distributing sound; and multichannel speaker arrays have established a paradigm for placing many individual electronic sound sources around an audience. A further contribution comes from the rise of participatory art as a genre in the 1950s and 1960s, when artists such as Allan Kaprow and Fluxus integrated the audience into their Happenings. By distributing performance instructions to the audience and considering them participatory agents, Fluxus and other artists established a framework through which an audience can help generate an artwork. As part of this movement, Laurie Anderson created an early example of a distributed sonic artwork when she performed *Car Horn Symphony* (1969), conducting an audience at a drive-in theater in New Hampshire to sound their car horns in a collaborative concert.

2. FOUNDATIONS: UGNAYAN

Filipino professor Jose Maceda's (1917-2004) acoustic and electronic works for masses of participants offer perhaps the most substantial framework for distributed music performance, a framework which has been replicated by many contemporary composers. Among his masterpieces, *Ugnayan* (1974), for a mass of participants with individual radio receivers, may be his most influential work. Broadcast on all 37 active radio frequencies in the city of Manila, the work encouraged residents of the city to take their radios out into the streets and turn them up, in order to create a collaborative sound collage across the city. Promoted as part of a government agenda to demonstrate the unity of the country, the work also holds a complicated relationship with the political environment of its era.

2.0.1 *The Landscape Maceda Inherits: Creative Radiophony in the 1950s-70s*

Repurposing handheld radio receivers as instruments was becoming common in the years preceding *Ugnayan*. John Cage's compositions *Imaginary Landscape No. 4* (1951), *Speech* (1955), and *Radio Music* (1956) were composed for ensembles of radios (up to 12), using the volume dial and tuning dial of the radio as instrumental controls. 15 years later, Karlheinz Stockhausen's rigorous approach to the ra-



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dio instrument yielded *Kurzwellen* (1968), *Spiral* (1968), *Pole* (1970), and *Expo* (1970), works in which ensembles of performers use radios to receive and transform sound using the radio receiver's affordances. In 1970, one of Stockhausen's performances of *Kurzwellen* occurred on the Beethoven centennial, a time at which most radio stations were broadcasting Beethoven—a first hint at the idea of using these devices to perform a coordinated collection of sounds.[16]

2.1 Precursor: *Cassette 100*

Maceda's compositional practice originated from avant-garde approaches to native Filipino instruments and ethnomusicological research, but evolved towards the use of electronic devices and *musique concrete* in the 1950s, a decade in which he witnessed Varese's multichannel spectacle *Poeme Electronique* at the 1958 World's Fair in Brussels, and worked with Pierre Schaeffer in his studio in Paris.

Maceda's adoption of portable handheld devices is first evident in his composition *Cassette 100* (1971), in which 100 performers hold tape players streaming *musique concrete* while moving around the concert venue in choreographed patterns. *Cassette 100* is formative for the genre of distributed music, as it harnesses a mass of handheld devices as a collective musical instrument, albeit devices which are held by performers rather than the audience.

2.2 Composition

Maceda composed *Ugnayan* in the tradition of *musique concrete*, and as an extension of it. He created 20 tapes of 51 minutes each, each tape intended to be broadcast on one of 37 radio channels in the city of Manila. The tapes contain an elaborate composition for traditional Filipino instruments, making use of recent developments in metric complexity and non-functional harmony (Fig. 2). Maceda aimed to avoid patterns or functional pitch relationships, instead creating "atmospheres, waves, clouds, fogs... blocks, screens and windows of sound" through the dispersal of sound among so many uncontrolled speakers.[14]

Maceda's assistant Ramón Santos notes how Maceda used the unique format as a compositional mechanism:

Instead of reprocessing and reshaping these sounds electronically in a studio, Maceda utilized the human energies and the physical space of town plazas and parks to reprocess the sounds in semi-improvised dispersion schemes. [14]

In other words, Maceda used distribution and participation, rather than the studio, as a means to compose *musique concrete*, to transform *objet sonores* into music. Santos continues that this created:

... a musical experience in which audience, performers, participants, space, and sounds play equal roles in both the compositional, experiential and re-creative processes. [14]

The title of *Ugnayan* translates to "Interlinking", and has many meanings within the piece, including the interplay of dispersed sound events, and the involvement of the audience within the work, as well as the linking of community members through social interactions, of music with the surrounding environment, and of traditional instruments with modern technologies.



Figure 1: Jose Maceda (left) at one of 150 locations for the premiere of *Ugnayan*. Image courtesy of Ramón Santos.

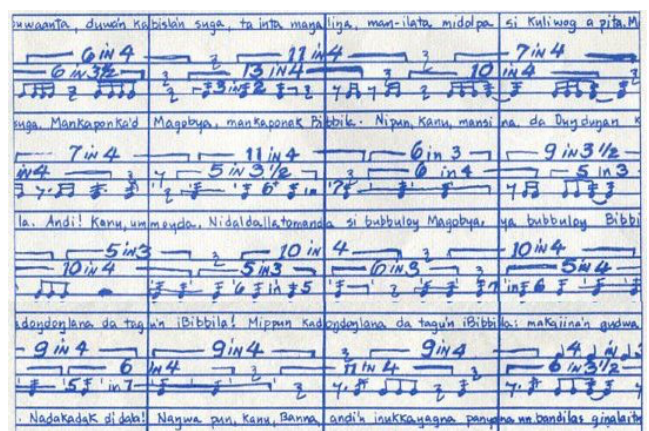


Figure 2: *Ugnayan* score excerpt. Image courtesy of Ramón Santos.

2.3 Performance and Legacy

Ugnayan was realized across Manila from 6-7 pm on New Year's Day of 1974 (Fig. 1). Santos writes, "People were instructed to participate and enjoy the event; e.g. moving around and listening to the atmospheric changes in the entire sonic environment." [14] This reflects a casual and exploratory listening format in common with many current distributed music concerts.

Maceda's assistant Ramón Santos and composer Chris Brown note, too, that the performance was in many ways a failure. It was successful as a political stunt, but lacked considerable participation from the public, and those who did participate had mixed responses to the music due to its avant-garde compositional ideas which clashed with popular musical tastes. [2]

However, in performing *Ugnayan* once, Maceda established a formal precedent for the use of an audience's electronic devices as a speaker array. In addition, the performance contributed to redefining the role of the composer in the latter half of the 20th century. Santos writes that Maceda "assigned the primary catalytic role to the people as partly sharing in the creative process, as performers, and as the audience." [14] Maceda's uncommon ability to commandeer all stations of a radio, and to organize the actions of an entire town through government propaganda, were crucial to the creation of *Ugnayan*, which stands as a towering precedent for the genre of distributed music.

3. DISTRIBUTED INTERVENTIONS: 1990-2010

Twenty years after *Ugnayan*, several artists began to explore the collective creative potential of electronic devices of various kinds, demonstrating a variety of different pathways into distributed music.

3.1 Heath Bunting, Cybercafe (1994)

UK-based artist Heath Bunting's *Cybercafe: Kings Cross Phone-In* was a guerilla performance that turned the pay phones in London's Kings Cross train station into a sound collage. Publicizing the phone numbers of several dozen Kings Cross payphones via his website, Bunting instructed anyone to, at 6 PM on August 4, 1994:

(1) call no./nos. and let the phone ring a short while and then hang up (2) call these nos. in some kind of pattern (3) call and have a chat with an expectant or unexpectant person (4) go to Kings X station watch public reaction/answer the phones and chat (5) do something different.[3]

Bunting seems to comment on the new age of networked media: that traditional paradigms of one-way communication (such as a payphone, which normally calls outward) were disintegrating. He takes a one-way communications medium and interacts with it, setting a precedent for current distributed music paradigms in which a performer sends messages to an audience's mobile phone and turns it into a remote instrument.

3.2 The Flaming Lips, Parking Lot Experiments and Boom Box Experiments (1996)

In 1996, the American rock band The Flaming Lips, based in Oklahoma City, performed a series of collaborative sound experiments with collections of car stereos and battery-operated tape players. In the first series, called *Parking Lot Experiments*, singer Wayne Coyne created 30 individual audio tapes and handed them out to audience members gathered at the parking garage of an Oklahoma City mall. Audience members played the tapes simultaneously on 30 car stereos. Later that year, the group coordinated events in which audience members brought battery-operated tape players to play distributed tapes—events known as *Boom Box Experiments*. At the first event, in San Francisco, 100 audience members participated by adjusting their volume knobs in response to Coyne's conducting. The audio content for both events involved highly independent tapes played simultaneously, similar to the model espoused by John Cage.

3.3 Chris Brown and Guillermo Galindo, Transmission (2002-9)

In the 2000s, Chris Brown and Guillermo Galindo designed their own distributed radio performances in the spirit of Jose Maceda, whose work Chris Brown has championed and helped document. In a series of *Transmission* performances including in Mexico City (Fig. 3), Newfoundland, and San Francisco, Brown and Galindo used homemade low-power FM transmitters to distribute music over four radio channels. Audience members were instructed to bring radios to the event, and were given the same performative role that Maceda gave to his audience—to freely explore specific radio frequencies. Like Maceda's *Ugnayan*, events took place outdoors, in public areas of the city. Sound was broadcast to and received by the audience, resulting in the composition emanating from the radios of the audience and mixing with the city's environment.



Figure 3: Chris Brown performing *Transmission: Naranja* in Mexico City, 2002. Image courtesy of Chris Brown.

4. FOUNDATIONS: DIALTONES

The first years of the 21st century saw a surge in phone art amid the widespread adoption of mobile phones. The ringtone became an *objet sonore* in artworks such as *Telephony* (2000) by Thomson and Craighead—in which 42 mobile phones placed in a gallery in London were called by viewers and call each other—and Peter Hrubesch's *Handywolke* (2001) in which 1200 mobile phones in a glass dome ring in response to crowd motion and calls from viewers.

In this context, an ambitious concert was imagined by Golan Levin, Gregory Shakar, and Scott Gibbons: a concert in which all sound would be made by mobile phones, primarily the mobile phones of the audience. *Dialtones: A Telesymphony* (2001) created "a chorus of organized social sound" by placing custom ringtones on the audience's mobile phones, and calling them from the stage. [11] Rather than the political sentiment of *Ugnayan*, *Dialtones* was purely a technological spectacle, a proof of concept of the musical potentials of a new technology.

4.1 Motivations

The *Dialtones* performance arose from a variety of motivations expressed by the creators, including: the opportunity posed by the mobile phone's sudden ubiquity; the intention to illustrate wireless social space; and the intention to treat the ringtone as a found object in the tradition of media art.

4.1.1 Accessibility

In an interview about *Dialtones*, Levin describes how the ubiquity of the mobile phone enabled the work:

Everyone is already carrying enough musical equipment in their pocket to participate in an orchestral ensemble. All you have to do is show up with your instrument, and it's your phone. [11]

The composers saw the opportunity to coordinate our pocket musical devices into a new type of mass electronic orchestra. By placing custom ringtone melodies on the audience's phones, the composers were able to emphasize the synthesis capabilities and musical possibilities of these common devices.

4.1.2 Social Space

Dialtones illustrated the wireless networks that surround us daily. As the artist statement for *Dialtones* states:

By placing every participant at the center of a massive cluster of distributed speakers, *Dialtones* makes the ether of cellular space viscerally perceptible... Everyone has such an individual relationship with their handset, and to suddenly think that you're part of a larger network of people... is something that is the case, but is rarely perceived. [11]

Dialtones can be understood as a sonification of our society's wireless networks, and as a reaction against the isolation of personal devices.

4.1.3 *Dialtones As Media Art*

Finally, *Dialtones* is a fetishization of the ringtone. The ringtone, in its unique sound and style, is used as a found object.

The ringing of mobile phones—ordinarily, the noise of business, of untimely interruptions, of humans enslaved to technology—is transformed into a sound of deliberate expression. [11]

While a work like *Dialtones* appears to be a new and novel event, it can be equally evaluated as an application of Modernist concepts to the present, such as: Laszlo Moholy-Nagy's philosophy of repurposing communications media for creative production; the Futurist's use of materials and sounds of daily life; and the notion of instrument invention as a way of accessing new musical forms.

4.2 Composition

Dialtones is structured as a concerto, a logical format for a piece which addresses the situated opposition of an on-stage performer and an audience chorus. The composers write:

The goal of *Dialtones*' three-part structure is to introduce the contrasting aesthetic possibilities of virtuosic real-time cellphone performance ("mobile phone jockeying") on the one hand, with coordinated-ensemble handheld-music on the other. [11]

The first section exposes the "orchestra"—the audience—through a series of sparse, humorous rings among the audience, then grows to a sustained musical interplay across audience phones. The second section introduces Scott Gibbons as a soloing "phone jockey" on stage, manually activating the ringtones of a handful of mobile phones which are amplified. The third section joins soloist and audience, as the performance "builds to a remarkable crescendo in which nearly two hundred mobile phones peal simultaneously." [11]

Like *Ugnayan*, the composers describe working with "sound-textures" rather than precise rhythms and melodies, no doubt a result of the lack of precise timing when coordinating so many devices.[11]

4.3 Performance and Legacy

Performed at Ars Electronica in Graz, Austria in 2001, *Dialtones* saw nightly audiences of about 200 participants. The composers set up a kiosk in the lobby of the concert hall to download custom ringtones onto the phones of incoming audience members in order to control the musical content of the concert (about two thirds of those downloads were reportedly successful).[11] The composers exerted further control over the performance by giving each audience member a specific seat in the hall, therefore enabling precise management of the spatial distribution of sound in the audience during performance (Fig. 4). The venue featured a

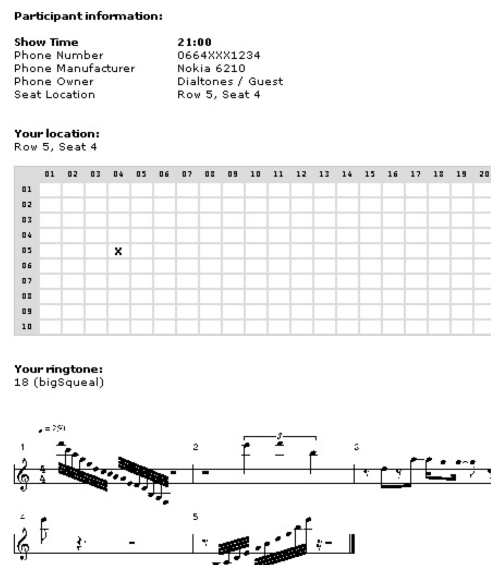


Figure 4: The *Dialtones* program, including seating location and custom ringtone score. Image courtesy of Golan Levin.

sophisticated visualization system wherein lights shone on audience members as they were being called, and a large mirror reflected a top-down view of the audience back to itself.

While *Dialtones* is the most commonly attributed precursor to modern distributed music, it contrasts starkly with *Ugnayan* in many respects. *Dialtones*' tight control over seating is rarely seen in contemporary distributed music, while Maceda's encouragement that the audience casually explore and participate in the work is a more common experience. The sound content of *Dialtones* is limited, due to the inflexible timbre of the ringtones of that era, whereas *Ugnayan* was able to broadcast richer musical content. A final distinction is that the *Dialtones* audience is passive, whereas *Ugnayan*'s is actively interacting with the radio as a musical interface.

However, *Dialtones* codifies many aspects of the genre: harnessing the ubiquitous mobile phone as a sound synthesizer, and using a network to coordinate a variety of sound events across a concert audience. Levin's core assertion that "[the mobile phone's] potential as an ingredient of art has been largely overlooked," [11] however tongue-in-cheek, has proved prophetic for a generation of mobile musicians and for the genre of distributed music.

5. EMERGENCE OF A GENRE: DISTRIBUTED MUSIC

Since the release of the iPhone in 2007, distributed music has transformed into a more flexible genre and coalesced around certain modes of implementation. The audio synthesis capabilities of the smartphone allow for richer, more diverse sound events, and the internet as a coordinator allows for more sophisticated communication schemes between performers and individual audience devices. Concerts have also become more feasible; most concertgoers already have the requisite materials in their pocket, rather than needing to show up with a special radio or stereo. Performances worldwide from 2010 to 2016 illustrate the proliferation of distributed music and its evolution from native mobile app instruments to networked web audio systems.



Figure 5: JODI’s *ZYX* mobile app, distributing body gestures to viewers in a gallery. Image courtesy of JODI.

5.1 Native Mobile Apps

From 2012-2014, projects by OK GO, Dan Deacon, Sang Won Lee, and Xavier Garcia distributed mobile music apps to their audiences to foster participation. Similar ideas were already being explored in mobile music, most notably by the Stanford Mobile Phone Orchestra whose 2010 concert focused on audience participation through distributed interfaces [12]. The strategy of interface distribution infiltrated visual art of the era as well, such as in the art collective JODI’s *ZYX* app (2012) which instructs its users to perform body gestures, turning an art gallery into a surreal dance (Fig. 5). It is clear that ideas of mass participation were percolating in the years following the advent of the smartphone. Here, we focus on attempts to use this capability to generate sound from within the audience.

OK GO and NPR, *Needing/Getting* (2012)

Perhaps the first event to use an audience’s smartphones as a collective instrument, the Los Angeles-based rock band OK GO collaborated with National Public Radio to create an audience participation segment as part of a live film broadcast of the radio show “This American Life.” The app gave each audience member three buttons, each an impulse for one of three notes. The audience was grouped into four colors—each group with a different set of three notes—therefore achieving twelve different notes in all. The audience followed a scrolling score onscreen that directed them how to play with beginner-friendly symbols. Fascinatingly, the band chose to play along as a bell choir—another ensemble in which each player is responsible for only a handful of notes, which, played in hocket, are part of a larger melody created by the ensemble. Broadcast to 300 theaters across America on May 10, 2012, this led to 300 different distributed concerts occurring at the same time.

Dan Deacon, *America* (2012)

During the same year, Keith Lea at Wham City Lights developed a standalone mobile app to accompany Baltimore electronic musician Dan Deacon’s *America* album tour. Primarily a lightshow app, the app was advertised to also create a sonic accompaniment to the music performed. The app used an ultrasonic audio impulse to synchronize phones to within 0.06 seconds.¹ The first concert occurred in Des Moines, Iowa, on July 7, 2012 and the band proceeded to perform with the app in over 50 other performances.

Sang Won Lee, *Echobo* (2012)

Sang Won Lee’s *Echobo* [10] [9] is a mobile instrument that is designed to be played by untrained audience members. In performances, audience members download the mobile

¹<http://offli.ne>

app which lets them play piano notes through a graphical interface. The cloud of audience notes creates a background texture while an electronic musician and acoustic musician perform on stage.

Xavier Garcia, *Belzebuth* (2014)

Xavier Garcia’s *Belzebuth* (2014), a 13-minute performance with the participation of the audience, was commissioned by Grame as part of their SmartFaust concert series featuring apps developed with the Faust language. In the *Belzebuth* app, the audience uses gesture, rather than a touch interface, to create sound, and are guided through a series of gestures by a conductor. The audience downloads the app beforehand through the web. Garcia notes how participation can change a viewer’s experience and help them understand the act of musical composition: “getting on the side of *doing*, [the audience] will experience a new audio sound as material, texture etc.” [6] therefore giving the audience insight into the compositional process.

5.2 Web Audio

Since the adoption of the Web Audio API² in mobile browsers in 2014-2015, and in tandem with open-source technologies developed within the Node.js framework, a number of distributed music performances have occurred which use websites as remotely-controlled audio synthesizers. While live audio streaming to audience devices is not yet a reality, performers can send small packets of control data to the audience in order to control web audio synthesis on the client-side. As Thomas Dolby—an early adopter of web-based audio—joked: you cannot send a cake through a phone line, but you can send the recipe if you’ve got flour, milk, and eggs on the other end.[4] Performances in this modality led to a series of entirely distributed concerts at the 2015 and 2016 Web Audio Conferences at IRCAM and Georgia Tech.

Tim Shaw and Sébastien Piquemal, *Fields* (2014)

One of the earliest distributed music performances to use web audio as a sound engine, *Fields* [15] premiered at the CTM (Club Transmediale) Festival on January 2014 in Berlin. In the work, all audience members with smartphones opened a mobile website containing a web audio engine. One performer sent control messages via WebSockets to create music in the audience’s browsers (Fig. 6), while another performer played a Pure Data patch through speakers on stage. These two soundscapes combined into a landscape of natural sounds emanating from within the audience.

IRCAM, CoSiMa and Collective Soundchecks (2014)

In a series of events and demos called Collective Soundchecks, beginning in May 2014, IRCAM’s CoSiMa group explores many different modalities of collaborative performance using smartphones, inspired by the confluence of the smartphone’s ubiquity, multimodal sensors, real-time audiovisual processing, and web standards. [13] In the composition *Drops* by Norbert Schnell and Sébastien Robaszkiewicz, melodic fragments played by individual audience members are sent from phone to phone and resynthesized, creating an echo effect and motivic relationships across the audience. The group leads several initiatives to expand the capabilities of distributed music, such as achieving precise synchronization of musical events across phones. [8] Collaborative Soundchecks continue to be performed at events worldwide.

Ben Hogue and Javier Sanchez *The Tomb of the Grammarian Lysias* (2014)

The Tomb of the Grammarian Lysias, for voice and audi-

²<https://webaudio.github.io/web-audio-api/>



Figure 6: Audience smartphones make sound during a performance of Tim Shaw and Sébastien Piquemal’s *Fields*. Image courtesy of Tim Shaw.

ence mobile devices, deploys live audio recordings in real time to audience phones. As a vocalist sings the titular Greek poem, samples of the singer’s voice are recorded and transmitted asynchronously to audience devices, where they play in a dispersed cloud. Houge notes how the performance correlates to the ritual gathering described in the poem, as well as the poem’s description of wandering through a vast archive. [7] Houge also mentions that he aims “to accept the sound of the phone and timing inaccuracies as an asset and build those attributes into the composition.”

Web Audio Conference (2015-2016)

The first Web Audio Conference, held at IRCAM in January, 2015, featured a concert consisting solely of distributed music performances using web audio technologies. The following works were performed: **Ben Houge**, *The Tomb of the Grammarian Lysias* (2014); **Sébastien Robaszkiewicz and Norbert Schnell**, *Drops* (2014); **Jesse Allison**, *Traversal* (2015); **Kita Toshihiro**, *Smartphone Jam Session with Audience* (2015); **Ben Taylor**, *Pearl River* (2015); and **Tim Shaw and Sébastien Piquemal**, *Fields* (2014).

The 2016 conference featured a distributed music concert of the following works: **Ben Houge**, *Ornithological Blog Poem* (2016); **Andrey Bundin**, *Concert for Smartphones* (2015); **William Walker and Brian Belet**, *Cross-Town Traffic 2.0* (2016); **Sang Won Lee and Antonio de Carvalho Jr**, *Crowd in Cloud* (2016); **Nihar Madhavan and Jeff Snyder**, *Constellation* (2015).

6. CONCLUSIONS

Distributed music arose not from the smartphone, but from a common interest across many practices to harness everyday electronic devices as distributed sound agents. Composers distributed music by: broadcasting sound over radio, handing out cassette tapes, downloading ringtones, sharing musical mobile apps, and sending live control messages to web audio engines in mobile web browsers. In each of these instances, composers arrived at distributed music by exploring the affordances of everyday technology.

This history conveys not one modality of performance, but a diverse array of practices. Divergent choices among these works include: whether the audience should participate in musical decisions, or be a passive receiver; whether the timing inaccuracies of latency should be adopted as part of the medium, or eliminated; whether to discern the location of each audience member or not; and whether the audience’s devices should provide an accompaniment for stage sound or be the sole source of music. Regardless of individual perspectives among these choices, the worldwide emergence of this genre indicates that, beyond its novelty, it offers a substantial new mode of musical expression.

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