THE MEANINGS OF MUSICS AND TECHNOLOGIES IN THE TWENTIETH CENTURY:

CASE STUDIES IN POSTWAR POP, AFROFUTURIST JAZZ, AND CHILEAN ELECTRONIC MUSIC

by

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ABSTRACT

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The University of Wisconsin–Milwaukee
Under the Supervision of Professor Gillian Rodger

This thesis analyzes Les Paul and Mary Ford's high-tech pop, Sun Ra's proto-afrofuturist jazz, and Chilean electronic music to explore how new modes of musical expression and technological advances were shaped in relation to gender, race, and political policy. Les Paul's development of new recording techniques reflected postwar attitudes toward scientific progress, and the way he presented these "New Sounds" with his wife Mary Ford reinforced gendered notions of domestic space. Sun Ra's appropriation of Space Age themes with the Arkestra was a synthesis of 1950s Black radicalism and racial uplift initiatives from his early life in Birmingham, Alabama that subverted dominant narratives of technological agency. The rapid development of electronic music in Chile was made possible by government support of educational and cultural institutions, which quickly evaporated when dictator Augusto Pinochet rose to power. These case studies reveal how both music and technology are woven into the tapestry of history and culture that gives them meaning.

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Introduction

In the twentieth century, technology took on an increasingly significant role in the social practice of music. New inventions and scientific breakthroughs brought about not only new ways of producing and disseminating music, but also shaped values and provided new ways of thinking about music and culture. At the same time, musical developments and social changes gave rise to new technological innovations and helped define the meaning and significance of technology in both music and society.[1] Music and technology are threads in a rich tapestry of culture and neither can be separated from social or historical context.[2] Rather, they take on meaning *because* they are woven into the fabric of culture.[3] The purpose of this study is to follow the threads that tie music and technology to broader sociocultural forces to uncover ways in which these disparate elements interact and influence one another.

This thesis presents three case studies in which music and technology are deeply intertwined with social issues. Chapter One examines the intersection of technology, gender roles and domestic space through the music of Les Paul and Mary Ford. Chapter Two explores the historical origins of afrofuturism and the relationship between technology and Blackness in the music of Sun Ra. Chapter Three analyzes the effects of political and economic policy on the development of music technology by tracing the development of electronic music in Chile. The 1950s are a seminal decade in all three case studies. It was then that Les Paul and Mary Ford reached the peak of their success as recording artists, Sun Ra assembled his flagship ensemble,

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[1] Timothy Dean Taylor, *Strange Sounds: Music, Technology & Culture* (New York: Routledge, 2001), 11.

[2] Gary Tomlinson, "The Web of Culture: A Context for Musicology," *19th-Century Music* 7, no. 3 (April 1984): 353.

[3] Antoine Hennion, "From ANT to Pragmatism: A Journey with Bruno Latour at the CSI," *New Literary History* 47 (2016): 293.; Tia DeNora, *Music in Everyday Life* (Cambridge: Cambridge University Press, 2000), 44.

the Arkestra, in Chicago, and a handful of young Chilean composers established the first electronic music studio in South America.

The scientific advances of the 1950s brought about material changes in how music was created and disseminated as well as new ways of understanding technology itself that was reflected in music.[4] Magnetic tape transformed how music was recorded while electronic computers developed for World War II missile tests found their way into industry, academia, and eventually electronic music studios. Transoceanic jets facilitated international collaboration. Atomic bombs and nuclear reactors split the atom while Soviet and American satellites circled the globe as supremacy of space and science became symbols of geopolitical superiority. The cultural effects of technologies are most visible when they are new, before they have become seamlessly integrated into the social fabric.[5] The technological advances of the mid twentieth century inspired Les Paul, Sun Ra, and Chilean composers like José Vicente Asuar to pursue new modes of musical expression, which makes them ideal case studies to explore the intersection of music and technology.

Yet the focus of this thesis is not the abstract, global effects of technology on music. Conceiving of technology as an autonomous, immaterial force obscures how technologies are used and take on meaning in specific situations, which leads to the fallacy of technological determinism.[6] Rather, new technologies create affordances for new forms of musical expression, but as social products, these musical forms will always, in part, be socially constructed. As sociologist Ian Hutchby writes, "Technologies can be understood as artefacts which may be both shaped by and shaping of the practices humans use in interaction with,

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[4] Taylor, *Strange Sounds*, 41-44.

[5] Ibid., 61.

[6] Bennett Hogg, "Music Technology, or Technologies of Music?," in *The Cultural Study of Music: A Critical Introduction*, ed. Martin Clayton, Trevor Herbert, and Richard Middleton (London: Routledge, 2011), 218.

around, and through them."[7] It is therefore necessary to engage with music technologies and examine their significance and use in specific historical and cultural contexts. The musicians in these three chapters engaged with different technologies in different places and created markedly different types of music for different audiences. Each of these case studies explores the cultural context that gave rise to these varied forms of technologically-mediated music in "thickly descriptive" detail to uncover how music and technology jointly participate in the web of signification that makes music meaningful.[8]

PERFORMING TECHNOLOGY IN THE HOME: THE POSTWAR POP OF LES PAUL AND MARY FORD

Husband and wife duo Les Paul and Mary Ford were chart-topping recording artists in the early 1950s. Their hallmark brand of approachable vocal pop music was a showcase for recording techniques that Paul developed in his home studio in the late 1940s. Drawing upon his experience as a radio technician and as an innovator of electric guitars, he invented or modified audio equipment to change the speed and pitch of guitar and vocal parts, create electronic echo and delay effects, and facilitate richly-layered "sound-on-sound" recordings. These techniques were marketed as "the New Sound" by Capitol Records, and Les Paul capitalized on postwar enthusiasm for high-tech commodities that symbolized scientific progress. The New Sound was a way to differentiate his music from that of other pop musicians and Paul kept his methods a secret. This secrecy added to the mystique of his music and reflected how scientific and technological development were presented to the public in the decade following World War II.[9] By using high-tech recording techniques to create accessible

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[7] Ian Hutchby, "Technologies, Texts and Affordances," *Sociology* 35, no. 2 (May 2001): 444.

[8] Clifford Geertz, "Thick Description: Toward an Interpretive Theory of Culture," in *The Interpretation of Cultures: Selected Essays* (New York: Basic Books, 1973), 310–23.

[9] Carroll W. Pursell, *Technology in Postwar America: A History* (New York: Columbia University Press, 2007), 60.

renditions of well-worn pop standards, Paul and Ford signaled to audiences that technology, while proliferating through American life at an unprecedented rate, posed no threat to the familiar social order. This musical formula was a success, and the duo had numerous top ten hits between 1950 and 1955, including "How High the Moon" and "Vaya con Dios."

Paul and Ford reached millions of American homes through regular performances on radio and television. These broadcasts were recorded at their *own* home and present Paul as a maverick inventor and Ford as a doting housewife. Attitudes toward new technology were often shaped in the home during the postwar era, and technology factored into the division of household labor and leisure time.[10] Paul and Ford's broadcast performances reinforce gendered notions of technological agency and domestic work. Analyzing the way in which they successfully performed technology in the home to middle-class American audiences provides insights into the interrelatedness of technology, gender roles, and domestic space in the early 1950s.

Much of the literature on Les Paul focuses on his contributions to the development of the electric guitar, rather than the New Sound or his work with Mary Ford. Furthermore, critically analyzing Les Paul's work is made difficult by his personal involvement in projects that present his legacy as an inventor and musician in an unfailingly positive light.[11] Mary Alice Shaughnessy acknowledges these difficulties in *Les Paul: An American Original,* which remains the definitive source on Paul and Ford's life together. Shaughnessy looks unflinchingly at Paul's tumultuous relationship with Mary Ford, which led the guitarist to withdraw support from the book after she began interviewing family members of Mary Ford.[12] There is little scholarship on Ford apart from her work with Les Paul, except for a chapter in Sarah Elizabeth Culpepper's

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[10] Keir Keightley, "Low Television, High Fidelity: Taste and the Gendering of Home Entertainment Technologies," *Journal of Broadcasting & Electronic Media* 47, no. 2 (June 2003): 252.

[11] John Paulson, *Les Paul: Chasing Sound*, Documentary (Koch Vision, 2007); *Les Paul's House of Sound* [Exhibit], Permanent Display at Discovery World (museum), Milwaukee, Wisconsin.

[12] Mary Alice Shaughnessy, *Les Paul: An American Original*, 1st ed (New York: W. Morrow, 1993): 300-301.

2013 dissertation "Performing Conformity, Unleashing Craft," which examines female vocalists in postwar American pop music.[13] Steve Waksman provides the most thorough analysis of Les Paul's "New Sound" in his book *Instruments of Desire*. Timothy Dean Taylor's *Strange Sounds* and Alban Zak's *I Don't Sound Like Nobody* are helpful resources for situating Les Paul's work within the broader context electronic experimentation of midcentury American music.[14]

Historian Michael Smith has written on the ways in which marketing tactics were applied to technologies like atomic energy and space travel, and how these techniques shaped American attitudes toward science in the postwar era.[15] The rapid increase in technological development after World War II has been well-documented, and books by Carroll Pursell and Ruth Schwartz Cowan explore the social and cultural effects of postwar technologies.[16] In *More Work for Mother*, Cowan also outlines how household technologies changed (or failed to change) the division of household labor.[17] Though her study ends in 1945, Ruth Oldenziel's *Making Technology Masculine* provides valuable background information about the historical shifts that led to the association of

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[13] Sarah Elizabeth Culpeper, "Performing Conformity, Unleashing Craft: Female Vocalists of Postwar Pop, 1945-1956" (Ph.D. diss., University of Virginia, 2013).

[14] Steve Waksman, "Pure Tones and Solid Bodies: Les Paul's New Sound," in *Instruments of Desire: The Electric Guitar and the Shaping of Musical Experience* (Cambridge, Mass: Harvard University Press, 1999), 36–74; Albin Zak, *I Don't Sound like Nobody: Remaking Music in 1950s America*, Tracking Pop (Ann Arbor: University of Michigan Press, 2010).

[15] Michael L. Smith, "Advertising the Atom," in *Government and Environmental Politics: Essays on Historical Developments Since World War Two*, ed. Michael J. Lacey (Washington, D.C.: Wilson Center Press, 1989), 233–62; Michael L. Smith, "Selling the Moon: The U.S. Manned Space Program and the Triumph of Commodity Scientism," in *The Culture of Consumption: Critical Essays in American History 1880-1980*, ed. Richard Wightman Fox and T.J. Jackson Lears (New York: Pantheon Books, 1983), 175–210.

[16] Carroll W. Pursell, *Technology in Postwar America: A History* (New York: Columbia University Press, 2007); Ruth Schwartz Cowan, *A Social History of American Technology* (New York: Oxford University Press, 1997).

[17] Ruth Schwartz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic Books, 1983).

technology with masculinity by the early twentieth century.[18] Elaine Tyler May's *Homeward Bound* provides a history of marriage, domesticity, and conformity in the early Cold War era.[19]

Lynn Spigel and Keir Keightley have written extensively on the gendering of home technologies in the postwar era.[20] Additionally, in her book *Welcome to the Dreamhouse*, Spigel describes how popular media often reinforced conformist, suburban ideals in the early 1950s. Though she focuses on the electric guitar and not Les Paul's recording techniques, Monique Bourdage applies Spigel and Keightley's work to her analysis of the gendering of the electric guitar and the influence of amateur radio hobbyists on music technologies.[21]

TECHNOLOGY, MUSIC, AND BLACKNESS: RACIAL UPLIFT IN SUN RA'S MYTH SCIENCE

Jazz keyboardist, composer, and bandleader Sun Ra assembled the Arkestra on the South Side of Chicago in the mid-1950s. With the Arkestra, Ra drew upon numerous musical and philosophical influences that he encountered during his early life in Birmingham, Alabama, and combined these influences with nascent Black radicalism in Chicago. The Arkestra was an anachronistic big band that harkened back to the dance orchestras of the 1930s, but also reached farther back in history by incorporating Ancient Egyptian themes and costumes. Ra combined these historical elements with an afrocentric vision of space travel through songs

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[18] Ruth Oldenziel, *Making Technology Masculine: Men, Women, and Modern Machines in America 1870-1945* (Amsterdam University Press, 1999).

[19] Elaine Tyler May, *Homeward Bound: American Families in the Cold War Era*, Revised edition (New York: Basic Books, 2017).

[20] Keir Keightley, "Low Television, High Fidelity: Taste and the Gendering of Home Entertainment Technologies," *Journal of Broadcasting & Electronic Media* 47, no. 2 (June 2003): 236–59; Keir Keightley, "'Turn It down!' She Shrieked: Gender, Domestic Space, and High Fidelity, 1948-1959," *Popular Music* 15, no. 2 (May 1996): 149–77; Lynn Spigel, *Make Room for TV: Television and the Family Ideal in Postwar America* (Chicago: University of Chicago Press, 1992).

[21] Monique Bourdage, "From Tinkerers to Gods: The Electric Guitar and the Social Construction of Gender," *Historical Studies Journal* 24 (2007): 15–28; Monique Bourdage, "'A Young Girl's Dream': Examining the Barriers Facing Female Electric Guitarists," *Journal of the International Association for the Study of Popular Music* 1, no. 1 (2010).

and performances that subverted the dominant mythology of the Space Race. The cosmos, for Ra, were an escape from the racial injustices of Jim Crow and discriminatory housing laws, and he believed that by coming into awareness of their technologically-advanced African heritage, Black Americans could join in the hope and promises of space travel.[22]

Since the 1990s, Sun Ra has been widely cited as a progenitor of *afrofuturism* for his novel reconceptualization of both Black history and Black futures. Ra's worldview, which he called Myth Science, crystallized in Chicago, where urban renewal initiatives in the postwar era decimated historically Black neighborhoods. Radical groups, like the Nation of Islam, rose in response to these threats and used the Space Race to criticize the government's neglect of Black urban spaces[23]. Ra regularly interacted with these radical groups in Washington Park, an informal forum for Black intellectual debate on Chicago's South Side.

The Arkestra was a product of this fledgling Black radicalism, but what set Sun Ra apart from his contemporaries was his utopian embrace of science and technology. Ra's early life in Birmingham was shaped by Booker T. Washington's message of racial uplift. Modernization in the late 1800s, was, for Washington, an opportunity for African Americans to achieve independence and autonomy. Ra experienced this vision made manifest in Birmingham's Black social clubs, libraries, and his high school, which was modeled after Washington's Tuskegee Institute. With the Arkestra, he carried this ethos of racial uplift into the Space Age. Just as Washington saw the modernizing South as a chance for Black Americans to rise above the indignities of slavery, Sun Ra imagined space travel as a vehicle for transcending the racial inequalities of postwar America.

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[22] Daniel Kreiss, "Appropriating the Master's Tools: Sun Ra, the Black Panthers, and Black Consciousness, 1952-1973," *Black Music Research Journal* 28, no. 1 (Spring 2008): 61.

[23] Lynn Spigel, "Outer Space and Inner Cities: African American Responses to NASA," in *Welcome to the Dreamhouse: Popular Media and Postwar Suburbs* (Durham & London: Duke University Press, 2001), 155-57.

Sun Ra has been the subject of numerous writings in recent years, but most scholarship focuses on his time in Chicago and his later career with the Arkestra, including Paul Youngquist's *A Pure Solar World: Sun Ra and the Birth of Afrofuturism*, the collection *Pathways to Unknown Worlds: Sun Ra and Chicago's Afro-Futurist Underground 1954-68*, and articles by Daniel Kreiss.[24] Despite its title, *Sun Ra's Chicago: Afrofuturism and the City* by urban studies scholar William Sites begins with a lengthy study of Birmingham in the early twentieth century before turning to a detailed analysis of the South Side of Chicago that gave rise to the Arkestra.[25] The best source about Ra's life in Alabama and his work before the Arkestra, however, remains John Szwed's definitive biography *Space is the Place: The Lives and Times of Sun Ra*.[26] Lynn Spigel's essay "Outer Space and Inner Cities" documents African American responses to the Space Race, which provides valuable insights into how Sun Ra's contemporaries in Chicago viewed space travel and is a helpful counterpart to Walter McDougall's comprehensive history of the Space Race, *The Heavens and the Earth*.[27]

Sun Ra is mentioned in some of the earliest afrofuturist texts, including Mark Dery's 1994 essay "Black the Future," which first introduced the term *afrofuturism*. Dery interviews science fiction writers Samuel Delany, Greg Tate, and Tricia Rose, all of whom cite Sun Ra as an

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[24] John Corbett, "Sun Ra in Chicago: Street Priest and Father of D.I.Y. Jazz," in *Pathways to Unknown Worlds: Sun Ra and Chicago's Afro-Futurist Underground 1954-68* (Chicago: WhiteWalls, University of Chicago Press, 2006); Paul Youngquist, *A Pure Solar World: Sun Ra and the Birth of Afrofuturism* (Austin: University of Texas Press, 2016); Daniel Kreiss, "Performing the Past to Claim the Future: Sun Ra and the Afro-Future Underground 1954-1968," *African American Review* 45, no. 1/2 (Spring/Summer 2012): 197–203; Daniel Kreiss, "Appropriating the Master's Tools: Sun Ra, the Black Panthers, and Black Consciousness, 1952-1973," *Black Music Research Journal* 28, no. 1 (Spring 2008): 57–81.

[25] William Sites, *Sun Ra's Chicago: Afrofuturism and the City*, Historical Studies of Urban America (Chicago: University of Chicago Press, 2020).

[26] John F. Szwed, *Space Is the Place: The Lives and Times of Sun Ra*, 1st ed (New York: Pantheon Books, 1997).

[27] Lynn Spigel, "Outer Space and Inner Cities: African American Responses to NASA," in *Welcome to the Dreamhouse: Popular Media and Postwar Suburbs* (Durham & London: Duke University Press, 2001), 141–84; Walter A. McDougall, *The Heavens and the Earth: A Political History of the Space Age* (Baltimore: Johns Hopkins University Press, 1997).

early influence.[28] Sun Ra's Myth Science philosophy is central to Kodwo Eshun's *More Brilliant than the Sun: Adventures in Sonic Fiction,* which explores how technology and futurism have influenced Black musical expression across a wide variety of genres.[29] The concept of afrofuturism developed through interdisciplinary discussions on online message boards through the late 1990s. Alondra Nelson's seminal 2002 article "Future Texts" articulates many of the core ideas of afrofuturism, including the synthesis of past and future themes, and the rejection of an essentialist incompatibility between Blackness and technological progress.[30]

Afrofuturism emerged out of Black science fiction and fantasy literature and writers like Nabeel Zuberi, Sofia Samatar, and Ytasha Womack discuss Sun Ra through a science-fiction lens.[31] Others have explored musical-afrofuturist themes in literature beyond science fiction. Alexander Weheliye, in his book *Phonographies: Grooves in Sonic Afro-Modernity*, argues that recording technology plays a central role in the African American musical experience through his reading of literary works like Ralph Ellison's *Invisible Man*.[32] Louis Chude-Sokei finds similar themes in Joel Chandler Harris' *Uncle Remus: His Songs and Sayings* from the late 1800s.[33]

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[28] Mark Dery, "Black to the Future: Interviews with Samuel R. Delany, Greg Tate, and Tricia Rose," in *Flame Wars: The Discourse of Cyberculture* (Durham & London: Duke University Press, 1994), 179–222.

[29] Kodwo Eshun, *More Brilliant than the Sun: Adventures in Sonic Fiction* (London: Quartet Books, 1998).

[30] Alondra Nelson, "Future Texts," *Social Text* 20, no. 2 (Summer 2002): 1–15.

[31] Nabeel Zuberi, "The Transmolecularisation of [Black] Folk: Space Is the Place, Sun Ra, and Afrofuturism," in *Off the Planet: Music, Sound and Science Fiction Cinema*, ed. Philip Hayward (Bloomington, IN: Indiana University Press, 2004), 77–95; Sofia Samatar, "Toward a Planetary History of Afrofuturism," *Research in African Literatures* 48, no. 4 (Winter 2017): 175–91; Ytasha Womack, *Afrofuturism: The World of Black Sci-Fi and Fantasy Culture*, First edition (Chicago: Chicago Review Press, 2013).

[32] Alexander G. Weheliye, *Phonographies: Grooves in Sonic Afro-Modernity* (Durham: Duke University Press, 2005); Alexander G. Weheliye, "'Feenin': Posthuman Voices in Contemporary African American Music," *Social Text* 20, no. 2 (2002): 21–47.

[33] Louis Chude-Sokei, "Prognosticating Echoes: Race, Sound, and Naturalizing Technology," *Current Musicology*, April 1, 2017, 77–86; Louis Chude-Sokei, *The Sound of Culture: Diaspora and Black Technopoetics* (Middletown, Connecticut: Wesleyan University Press, 2016).

In 2008, composer George Lewis noted that afrofuturists in the 1990s opened the door to a broader exploration of technology and the Black experience beyond the science fiction focus of early afrofuturist writings.[34] Rayvon Fouché's 2006 article "Say It Loud, I'm Black and I'm Proud" introduced the concept of *Black vernacular technological creativity*, which explores how Black artists *redeploy, reconceive,* and *re-create* technologies by changing both their material function and their symbolic meaning.[35] Griffith Rollefson, in "The 'Robot Voodoo Power' Thesis," draws upon Nelson, as well as other scholars like Paul Gilroy, to explore how musicians like Sun Ra, George Clinton, and Kool Keith subverted racial binaries in their performance of outer space-themed music.[36]

MUSIC TECHNOLOGY AND THE STATE: THE DEVELOPMENT OF ELECTRONIC MUSIC IN CHILE

Electronic music in Chile emerged during a period of political polarization that was fueled, in part, by Soviet and American involvement in the country's elections. Composers at Chilean universities and conservatories enjoyed state support of education and cultural programs, which allowed electronic music to flourish between the mid 1950s and early 1970s. Chilean electronic musicians, most notably José Vicente Asuar, made significant advances in the field of computer music and attracted international attention. Their work inspired composers across South America and led to the formation of electronic music studios in Argentina, Brazil, and Venezuela. The election of socialist president Salvador Allende in 1970 led to an increase in state support for Chilean universities and made education accessible to more students.

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[34] George E. Lewis, "Foreword: After Afrofuturism," *Journal of the Society for American Music* 2, no. 2 (May 2008): 139–53.

[35] Rayvon Fouché, "Say It Loud, I'm Black and I'm Proud: African Americans, American Artifactual Culture, and Black Vernacular Technological Creativity," *American Quarterly* 58, no. 3 (2006): 639–61.

[36] J. Griffith Rollefson, "The "Robot Voodoo Power' Thesis: Afrofuturism and Anti-Anti-Essentialism from Sun Ra to Kool Keith," *Black Music Research Journal* 28, no. 1 (April 2008): 83–109.

In 1973, Allende was overthrown in a violent CIA-backed coup d'état led by General Augusto Pinochet. Pinochet rapidly purged all elements of socialism from the Chilean government and enacted extreme free market economic policies. The universities were privatized and experimental research and artistic programs, like the electronic music studios, were shuttered. Most early pioneers of electronic music fled Chile and continued their work in exile. Though electronic music was never formally censored, the composers who stayed were unable to continue their work without institutional support. The development of electronic music in Chile effectively ended by the 1980s.

Pinochet was unseated in 1988 and since then, academic and private institutions have emerged to support electronic music in Chile. Yet the damage caused by the Pinochet years led to a loss of cultural knowledge, and the work of early Chilean electronic musicians was largely forgotten. As diasporic Chilean musicians returned from exile, they imported electronic music practices from abroad. The home-grown experimentation of Asuar and others was replaced by foreign styles, leading to the misconception that electronic music originated in Europe and the United States before spreading to South America. In reality, Chilean composers and engineers were on the vanguard of many important technological developments before political and economic policies made the country inhospitable to electronic experimentation.[37]

Contemporary Chilean composers and researchers, including Alejandro Albornoz, Martin Fumarola, Silvia Herrera, and Federico Schumacher, have worked to uncover and

[37] Ricardo Dal Farra, "Something Lost, Something Hidden, Something Found: Electroacoustic Music by Latin American Composers," *Organised Sound* 11, no. 2 (2006): 137.

document the early history of electronic music in their country.[38] Argentinian researcher Ricardo Dal Farra, with the support of the Daniel Langlois Foundation in Montréal, has created an archive of South American electronic music and published on Latin American electroacoustic music in international journals.[39] Chilean electronic musicians and international composers, including Asuar, Gustavo Becerra, and Werner Meyer-Eppler,

[38] Alejandro Albornoz, "Computer Music in Chile: The Beginning and Some Paths to Nowadays, An Historical Review," in *The Art of Electroacoustic Music, Proceedings of the Electroacoustic Music Studies Network* (Electroacoustic Music Studies Network, Sheffield, U.K., 2015); Alejandro Albornoz, "Música y Tecnología En Chile: Reflexiones Sobre Su Desarrollo e Implicancias Culturales," in *Instalando: Arte & Cultura Digital*, ed. Ignacio Nieto, Italo Tello, and Ricardo Vega (Santiago: LOM Ediciones, 2007), 29–35; Silvia Herrera, "Eduardo Maturana: Un Compositor Del Siglo XX," *Revista Musical Chilena* 57, no. 199 (January 2003); Silvia Herrera, "Gabriel Brnčić: Un Primer Acercamiento Hacia El Compositor y Maestro Chileno En El Exilio," *Revista Musical Chilena* 59, no. 204 (December 2005): 26–59; Federico Schumacher, "Compositores chilenos a través de ellos mismos. José Vicente Asuar: el compositor virtuoso," *Revista Musical Chilena* 71, no. 227 (2017): 265–72; Federico Schumacher, "50 Años de Música Electroacústica En Chile," *Revista Musical Chilena* 61, no. 208 (December 2007): 66–81; Federico Schumacher, "La Música Electroacústica de Gustavo Becerra (Homenaje a Sus 80 Años)," *Revista Musical Chilena* 61, no. 207 (June 2007); Federico Schumacher, "Catálogo de Las Obras Electroacústicas de Gustavo Becerra-Schmidt," *Revista Musical Chilena* 61, no. 207 (June 2007); Federico Schumacher, *La Música Electroacústica en Chile: 50 Años* (Santiago de Chile: Confederación Internacional de Música Electroacústica, Comunidad Electroacústica de Chile, 2005).

[39] Ricardo Dal Farra, "Something Lost, Something Hidden, Something Found: Electroacoustic Music by Latin American Composers," *Organised Sound* 11, no. 2 (2006): 131–42; Ricardo Dal Farra, "Un Voyage Du Son Par Les Fils Électroacoustiques: L'art et Les Nouvelles Technologies En Amérique Latine" (Doctoral Thesis, Montréal, Université du Québec à Montréal, 2006); Ricardo Dal Farra, "The Southern Tip of the Electroacoustic Tradition," *Circuit: Musiques Contemporaines* 17, no. 2 (2007): 65–72; Ricardo Dal Farra, "Latin American Electroacoustic Music Collection," The Daniel Langlois Foundation for Art, Science, and Technology, 2010; Ricardo Dal Farra, "Research-Creation in Latin America," in *The Routledge Research Companion to Electronic Music: Reaching out with Technology*, ed. Simon Emmerson (New York: Routledge, 2020), 21–48.

regularly published reports on their developments in the *Revista Musical Chilena* between the 1950s and 1970s.[40]

The political history of Chile in the late twentieth century has been studied extensively, with particular focus on the Allende and Pinochet years. Pablo Ruiz-Tagle's *Five Republics and One Tradition* situates the turmoil of these years within a longer political history of Chile.[41] Patricia Silva and Zakia Shiraz have examined the role of the CIA in the coup d'état that unseated Allende and the political machinations that allowed Pinochet to hold on to power, while Valerie Brender has documented the influence of American neoliberal economists on Pinochet's fiscal policy.[42] Eden Medina's *Cybernetic Revolutionaries* traces the Chilean government's support of computing

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[40] José Vicente Asuar, "En El Umbral de Una Nueva Era Músical," *Revista Musical Chilena* 64 (1959): 11–32; José Vicente Asuar, "Música Electrónica: Poética Musical de Neustros Días," *Revista Musical Chilena* 17, no. 86 (1963): 12–21; José Vicente Asuar, "Música Con Computadores: ¿Cómo Hacerlo?," *Revista Musical Chilena* 118 (1972): 36–66; José Vicente Asuar, "Haciendo Música Con Un Computador," *Revista Musical Chilena* 27, no. 123 (1973): 81–82; José Vicente Asuar, "Recuerdos," *Revista Musical Chilena* 131 (1975): 5–22; José Vicente Asuar, "Un Sistema Para Hacer Musica Con Un Microcomputador," *Revista Musical Chilena* 151 (1980): 5–28; José Vicente Asuar and Lejaren Hiller, "Programmed Control of Analog Sound Generators by Digital Computer," *SUNYAB*, 1973; Gustavo Becerra, "¿Qué Es La Música Electrónica?," *Revista Musical Chilena* 11, no. 56 (1957): 27–44; Gustavo Becerra, "En Torno al Exilio y a La Transición a Una Forma de Inmigración: Recuerdos Sueltos y Personales," *Revista Musical Chilena* 57, no. 199 (January 2003); Werner Meyer-Eppler, "Principios de La Música Electrónica," *Revista Musical Chilena* 13, no. 64 (1959): 6–10.

[41] Pablo Ruiz-Tagle, *Five Republics and One Tradition: A History of Constitutionalism in Chile 1810-2020*, trans. Ana Luisa Goldsmith, Cambridge Studies in Law and Society (Cambridge: Cambridge University Press, 2021).

[42] Valerie Brender, "Economic Transformations in Chile: The Formation of the Chicago Boys," *The American Economist* 55, no. 1 (2010): 111–22; Patricio Silva, "Augusto Pinochet: The Emergence of One-Man Rule in Chile (1915-2006)," in *Dictators and Autocrats* (London: Routledge, 2021), 71–90; Zakia Shiraz, "Review: CIA Intervention in Chile and the Fall of the Allende Government in 1973," *Journal of American Studies* 45, no. 3 (August 2011): 603–13.

technology, which reached an apex during the Allende years.[43] This topic is further explored in articles by Juan Alvarez, Claudio Gutierrez, and Katharina Loeber.[44]

Alessandro Fornazzari's *Speculative Fictions* and Caterina Preda's *Art and Politics Under Modern Dictatorships* explore the cultural effects of Pinochet-era economic policy in Chile.[45] Jedrek Mularski's *Music, Politics, and Nationalism in Latin America* describes how different musical styles became associated with political factions and ideologies in Chile during the Cold War.[46] While none of these books deal directly with electronic music, they provide important historical context for resources by Albornoz, Fumarola, Schumacher, and others.

ANALYSIS

This study draws upon Gary Tomlinson's musicological application of Clifford Geertz's interpretive theory of culture to investigate the social forces that gave meaning to the work discussed in these cases studies.[47] Empirical observations and formal logic alone are insufficient to account for cultural practices like music. In Tomlinson's and Geertz's model, facts must always be considered within a broader historical and social context.[48] The centrality

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[43] Eden Medina, *Cybernetic Revolutionaries: Technology and Politics in Allende's Chile* (Cambridge, Mass: MIT Press, 2011).

[44] Juan Alvarez and Claudio Gutierrez, "History of Computing in Chile, 1961-1982: Early Years, Consolidation, and Expansion," *IEEE Annals of the History of Computing* 34, no. 3 (July 2012): 22–33. Katharina Loeber, "Big Data, Algorithmic Regulation, and the History of the Cybersyn Project in Chile, 1971–1973," *Social Sciences* 7, no. 4 (April 13, 2018).

[45] Alessandro Fornazzari, *Speculative Fictions: Chilean Culture, Economics, and the Neoliberal Transition*, Illuminations: Cultural Formations of the Americas (Pittsburgh, Pa: University of Pittsburgh Press, 2013); Caterina Preda, *Art and Politics under Modern Dictatorships: A Comparison of Chile and Romania* (New York: Palgrave Macmillan, 2017).

[46] Jedrek Mularski, *Music, Politics, and Nationalism in Latin America: Chile during the Cold War Era*, Cambria Studies in Latin American Literatures and Cultures Series (Amherst, New York: Cambria Press, 2014).

[47] Clifford Geertz, "Thick Description: Toward an Interpretive Theory of Culture," in *The Interpretation of Cultures: Selected Essays* (New York: Basic Books, 1973), 310–23.

[48] Tomlinson, "The Web of Culture," 354.

of technology within these case studies complicates sociocultural analysis. Technologies are often the functional application of scientific principles and therefore would appear to lend themselves to empirical analysis and logical deduction.[49] But technologies are also the products of knowledge cultures and, as sociologist Langdon Winner has shown, cultural and political beliefs, values, and prejudices may be embedded within technologies themselves.[50]

To reconcile the technical and cultural ontologies of technology, Trevor Pinch, Wiebe Bijker, Ronald Kline, and Stewart Russell have proposed a *social construction of technology* model.[51] Central to this approach is the division of technologies into *facts* and *artefacts*. *Facts* refer to the cultural knowledge, tastes, and values attached to technologies, while *artefacts* are their material manifestations.[52] The knowledge cultures involved in creating meaning for technologies leads to the emergence of *social groups* who share a similar understanding of technological *artefacts*.

This division of technologies into *facts* and *artefacts*, as well as the concept of knowledge cultures, moves them out of the realm of science and into the social arena. Radical social constructivists like Keith Grint and Steve Woolgar have argued that technologies are thus no different from other cultural objects,[53] but this view overlooks the material function and limitations of *artefacts*. Instead, sociologist Ian Hutchby proposes that technologies should be

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[49] Steve Woolgar, "The Turn to Technology in Social Studies of Science," *Science, Technology, & Human Values* 16, no. 1 (January 1991): 30.

[50] Langdon Winner, "Do Artifacts Have Politics?," *Daedalus* 109, no. 1 (Winter 1980): 121–36.

[51] Trevor J. Pinch and Wiebe E. Bijker, "The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," *Social Studies of Science* 14, no. 3 (1984): 399–441; Stewart Russell, "The Social Construction of Artefacts: A Response to Pinch and Bijker," *Social Studies of Science* 16, no. 2 (May 1986): 331–46; Ronald Kline and Trevor Pinch, "Users as Agents of Technological Change: The Social Construction of the Automobile in the Rural United States," *Technology and Culture* 37, no. 4 (October 1996): 763–95.

[52] Pinch and Bijker, "Social Construction of Facts and Artefacts," 419-420.

[53] Keith Grint and Steve Woolgar, *The Machine at Work: Technology, Work, and Organization* (Cambridge, UK; Malden, MA: Blackwell Publishers: Polity Press, 1997).

considered in terms of *affordances*, the possibilities for action that they offer to the user.[54] Affordance is closely related to *agency*, since technologies may increase individuals' capacity to act in different social situations. The concept of agency is central to much sociocultural analysis and has been articulated by many theorists, including Ingrid Monson, Edwin Sayes, Bruno Latour, and Rayvon Fouché.[55]

The conclusion of this thesis compares and contrasts the three case studies. Technology had different functions and meanings for Les Paul, Sun Ra, and early Chilean electronic musicians. Each interacted with the *facts* and *artefacts* of technologies in different ways and were influenced by different knowledge cultures and social groups. Agency is a central theme in all three case studies, and the agency of the musicians in these chapters was shaped by their use of technology, attitudes toward race and gender, and political policy. Finally, these case studies have had lasting effects, since cultural knowledge from these moments has become durable due to the central role of technology that technology played in each historical episode.[56]

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[54] Ian Hutchby, "Technologies, Texts and Affordances," *Sociology* 35, no. 2 (May 2001): 447.

[55] Laura M. Ahearn, "Language and Agency," *Annual Review of Anthropology* 30, no. 1 (October 2001): 109–37; Ingrid Monson, "Hearing, Seeing, and Perceptual Agency," *Critical Inquiry* 34, no. S2 (January 2008): S36–58; Bruno Latour, *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge, Mass.: Harvard University Press, 1999); Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network Theory* (Oxford: Oxford University Press, 2005); Edwin Sayes, "Actor-Network Theory and Methodology: Just What Does It Mean to Say That Nonhumans Have Agency?," *Social Studies of Science* 44, no. 1 (2014): 124–49. Rayvon Fouché, "Say It Loud, I'm Black and I'm Proud: African Americans, American Artifactual Culture, and Black Vernacular Technological Creativity," *American Quarterly* 58, no. 3 (2006): 639–61.

[56] Bruno Latour, "Technology Is Society Made Durable," *The Sociological Review* 38, no. 1 (May 1990): 103–31.

Performing Technology in the Home: The postwar pop of Les Paul and Mary Ford

INTRODUCTION: SITTING ON TOP OF THE WORLD

Episodes of the short television show *Les Paul and Mary Ford at Home* are light on exposition. The syndicated program was a showcase for the husband and wife's music and the skeletal plots only exist to present an image of happy family life and to provide some light-hearted humor. Yet even these four short lines, recorded in the kitchen of their New Jersey home in 1953, reveal the themes of electronic technology, gender roles, and domestic space that were central to their public image:

LP: Hi Mary, I fixed the cord on the iron.
MF: Thanks, honey!
LP: How about doing "Sitting on top of the World" while you unpack the groceries?
MF: Okay!
I'm sitting on top of the world, just rollin' along…[1]

Guitarist Les Paul and singer Mary Ford were, indeed, sitting on top of the musical world in the early 1950s. In addition to their popular radio and television shows, the couple had sixteen top ten hits between 1950 and 1954, played for the Queen of England and President Eisenhower, and regularly sold out venues throughout the United States.[2] They capitalized on widespread enthusiasm for science and technology following World War II by

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[1] *Les Paul and Mary Ford at Home*, 1953,"Sitting on Top of the World." 170 episodes of the show were produced, but only ten have been preserved and are available through the Internet Archive. Each episode is about five minutes long and features an advertisement for Listerine mouthwash or another cosmetic product made by Warner-Lambert (Listerine's parent company). It was syndicated through 1960 and ran as often as five times a day, five days a week on some networks as filler between other programming.

The song "I'm Sitting on Top of the World" was written by Ray Henderson, Sam Lewis, and Joe Young in 1925. Les Paul and Mary Ford's 1953 recording of the song reached number ten on the U.S. pop charts.

[2] Sarah Elizabeth Culpeper, "Performing Conformity, Unleashing Craft: Female Vocalists of Postwar Pop, 1945-1956" (Ph.D. diss., University of Virginia, 2013), 152.

creating accessible pop music using recording techniques developed by Paul in the late 1940s. Paul's innovations made it possible for the duo to overdub numerous guitar and vocal parts, simulate echo, speed up recordings, and other seemingly superhuman musical feats. Dubbed "The New Sound," these effects signaled modernity and technological progress to listeners and became part of all their performances on the stage, radio, television, and records.[3]

This chapter explores how Les Paul's music reflected changing cultural attitudes toward technology in the United States in the postwar era. Advances during World War II and the early Cold War led to the proliferation of new technologies, yet the speed of technological progress, combined with widespread secrecy surrounding scientific research meant that few Americans understood how many new technologies worked.[4] To counter fears over this inscrutability of technology and its potential threat to human agency, advertisers and government organizations transformed scientism into a marketing tactic.[5] By ascribing almost magical power to science, technological commodities became symbols of prosperity and geopolitical superiority.[6] Les Paul capitalized on these trends by shrouding his own methods in secrecy. In doing so, he maintained a creative advantage over other pop artists while also linking his music to a broader narrative of technological progress.

Because postwar technologies radically transformed middle-class American homes, the popular conception of technology was frequently shaped in relation to domestic space and

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[3] Albin Zak, *I Don't Sound like Nobody: Remaking Music in 1950s America*, Tracking Pop (Ann Arbor: University of Michigan Press, 2010), 67.

[4] Carroll W. Pursell, *Technology in Postwar America: A History* (New York: Columbia University Press, 2007), 65.

[5] Michael L. Smith, "Advertising the Atom," in *Government and Environmental Politics: Essays on Historical Developments Since World War Two*, ed. Michael J. Lacey (Washington, D.C.: Wilson Center Press, 1989), 233–62.

[6] Michael L. Smith, "Selling the Moon: The U.S. Manned Space Program and the Triumph of Commodity Scientism," in *The Culture of Consumption: Critical Essays in American History 1880-1980*, ed. Richard Wightman Fox and T.J. Jackson Lears (New York: Pantheon Books, 1983), 179.

gender roles.[7] Paul and Ford worked out of their home and their domestic life was a key part of their broadcast performances. Beginning with the NBC radio program *The Les Paul Show with Mary Ford* and later the Listerine-sponsored television show *Les Paul and Mary Ford at Home*, Paul was presented as a genius, maverick inventor and Ford as a happy housewife who sings while dutifully doing chores and calls upon her husband to fix appliances.[8] This *Ozzie and Harriet*-style routine made them relatable in the 1950s, when white Americans married and flocked to the suburbs in record numbers.[9] Yet it also reveals how technological agency was framed through the lens of gendered division of labor in the home.[10]

Paul aimed for mainstream appeal when he brought his wife into his act. By presenting the new production techniques using the conventions of popular technoutopian discourse, Les Paul and Mary Ford reassured listeners that while the New Sound was novel and perhaps even mysterious, it would not radically upset familiar musical conventions.[11] They tempered the newness of Paul's techniques by performing conservative gender roles and inoffensive pop standards that symbolized optimism and prosperity.[12] And by recording programs that were broadcast into millions of American homes from their *own* home, they appealed to a conformist culture that valorized stability through domesticity.[13] Analyzing

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[7] Keir Keightley, "Low Television, High Fidelity: Taste and the Gendering of Home Entertainment Technologies," *Journal of Broadcasting & Electronic Media* 47, no. 2 (June 2003): 253.

[8] Mary Alice Shaughnessy, *Les Paul: An American Original*, 1st ed (New York: W. Morrow, 1993), 180; 216-17.

[9] Elaine Tyler May, *Homeward Bound: American Families in the Cold War Era*, Revised edition (New York: Basic Books, 2017), 14.

[10] Keir Keightley, "'Turn It down!' She Shrieked: Gender, Domestic Space, and High Fidelity, 1948-1959," *Popular Music* 15, no. 2 (May 1996): 149–77.

[11] Steve Waksman, "Pure Tones and Solid Bodies: Les Paul's New Sound," in *Instruments of Desire: The Electric Guitar and the Shaping of Musical Experience* (Cambridge, Mass: Harvard University Press, 1999), 63.

[12] Ibid., 70.

[13] Ibid., 61.

how Les Paul and Mary Ford achieved this synthesis sheds light on how technology, gender, and the home were deeply entangled in postwar America.

BIOGRAPHIES

Les Paul

Lester Polsfuss (1915-2009) was born in Waukesha, Wisconsin to George and Evelyn Polsfuss. A largely self-taught musical prodigy, he began playing harmonica at eight years old followed by guitar shortly thereafter. His parents divorced when he was a child and he raised by Evelyn, who doted over him and encouraged his musical ambition.[14] By his early teens he was entertaining audiences at lake resorts near Waukesha and on southern Wisconsin radio stations singing humorous hillbilly songs under the stage name "Red Hot Red."[15] Lester dropped out of school in 1932 moved moved to Saint Louis with country musician "Sunny" Joe Wolverton, who had been offered a regular morning show on KMOX radio. Ten years his senior, Wolverton gave Polsfuss the nickname "Rhubarb Red" and the two performed together as the Ozark Apple Knockers.[16] In 1934, they moved to Chicago and became regulars on WBBM radio.

Lester first encountered jazz in Chicago and began sitting in at nightclubs on the city's South Side. He was inspired by recordings of pianist Art Tatum and "gypsy jazz" guitarist Django Reinhardt and began imitating the latter's virtuoso style of guitar playing.[17] He chose the name "Les Paul" for his jazz performances but remained Rhubarb Red for hillbilly radio

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[14] Shaughnessy, *Les Paul*, 31-32.

[15] Les Paul and Michael Cochran, *Les Paul: In His Own Words*, Special Limited Edition (West Plains, Missouri: The Russ Cochran Co., 2005), 28.

[16] Shaughnessy, *Les Paul*, 48-49.

[17] Waksman, "Pure Tones and Solid Bodies," 70.

shows.[18] After Wolverton left Chicago, Paul formed a jazz trio with rhythm guitarist Jimmy Atkins and bassist Ernie Newton.[19] He married Virginia Webb in 1937.

In 1938, the trio moved to New York City and were quickly hired by bandleader Fred Warning to play in his dance orchestra and appear on his popular NBC radio program, *The Fred Waring Show*. Paul's gypsy jazz-inspired solos caught the attention of audiences who were accustomed to hearing guitar as solely a rhythm instrument.[20] He fell in with the Harlem jazz scene and performed with his idol Art Tatum and saxophonist Lester Young.[21] In 1941, exhausted from the demands of playing in Waring's band, he decide to move to Los Angeles to pursue a gig on Bing Crosby's *Kraft Music Hall* radio show.[22]

Alongside his performing career, Paul experimented with electronics and music technology from an early age. In 1927, he built his first crystal radio and joined the ranks of many amateur radio enthusiasts.[23] He spent his free time in Waukesha learning from radio station engineers and collected discarded parts from electronics repair shops. By high school, he had gained enough knowledge to build his own radio transmitter and also constructed a crude record-cutting lathe that allowed him to record music with his bandmates.[24] Later, in New York, he established an unlicensed radio station in their basement of the apartment he shared with Jimmie Atkins and Eddie Newton. Like many amateurs who "tinkered" with radios

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[18] Shaughnessy, *Les Paul*, 60-61.

[19] Paul and Cochran, *Les Paul: In His Own Words*, 78-79.

[20] Shaughnessy, *Les Paul*, 89.

[21] Waksman, "Pure Tones and Solid Bodies," 67.

[22] Shaughnessy, *Les Paul*, 99.

[23] Monique Bourdage, "From Tinkerers to Gods: The Electric Guitar and the Social Construction of Gender," *Historical Studies Journal* 24 (2007): 18.

[24] Paul and Cochran, *Les Paul: In His Own Words*, 31-32.

in the 1930s, Paul learned how to build and modify electronics to improve reception, decrease noise, and amplify signals, and he used these skills to distinguish himself as a guitar player.[25]

He made his first of many modifications to the guitar when he was performing hillbilly music as Red Hot Red in Wisconsin. By attaching a phonograph cartridge to the bridge of his guitar and connecting it to a speaker, young Lester found that he could be better heard in the crowded resorts and taverns where he played.[26] This contraption, while effective in increasing the volume of the guitar, produced a great deal of distortion. He discovered what many other electric guitar makers soon learned: that with an increase in volume comes an increase in noise.[27]

Prior to the 1950s, commercially available electric guitars were essentially acoustic instruments outfitted with a magnetic pickup that could be connected to an amplifier. Acoustic guitars, like cellos or violins, rely on a hollow resonating cavity to amplify and project the sound of the strings. These hybrid acoustic-electric guitars were limited in volume, however, because the acoustic resonance and electronic amplification worked against one another, causing feedback, noise, and poor tone.[28] Paul became convinced that the electric guitar required an entirely different approach. Instead of using a hollow body that vibrated freely, he began experimenting with "solid-body" instruments designed to *minimize* vibration and transfer the sound of the strings directly into the pickups. In 1941, after his success playing several modified instruments with the Fred Waring band, Paul persuaded luthiers at the Epiphone company in New York to build a prototype solid-body guitar. Dubbed "the Log," it was essentially a solid block of wood with decorative "wings" attached to give it the appearance of a conventional guitar.[29] The Log verified his theories of electric guitar design and he began using

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[25] Waksman, "Pure Tones and Solid Bodies," 42.

[26] Shaughnessy, *Les Paul*, 14.

[27] Waksman, "Pure Tones and Solid Bodies," 46.

[28] Ibid., 43.

[29] Ibid.

it for recording sessions and radio performances. In the early 1940s, Paul was rebuffed by the Gibson company after he approached them about mass producing a solid-body guitar.[30] A decade later, however, after Paul and other popular recording guitarists had proven the potential of solid-body instruments, Gibson changed their mind. The Gibson Les Paul signature guitar was released in 1952 and remains in production today.[31]

Mary Ford

Mary Ford (1924-1977) was born Iris Colleen Summers in Pasadena, California. The third of seven children in a strict religious family, her father Marshall was a Nazarene minister and her mother, Dorothy, taught Colleen (as she was known) and her siblings music from an early age. In 1939, Marshall Summers launched a religious radio show on KPAS radio. He preached, Dorothy played organ, and Colleen played guitar while the chorus of Summers children sang old-time church songs. Colleen began performing at churches and recording Christian music with her siblings and friends.[32] She dropped out of high school and quickly attracted attention at talent shows and state fairs throughout southern California. Colleen married and divorced twice before she turned nineteen.[33]

Her first big break came when she was hired on *Dinner Bell Round-Up*, a hillbilly radio program hosted by Cliffie Stone on KXLA in Los Angeles. Stone was drawn to her natural talent as a singer and ability to harmonize, but also her rhythm guitar and upright bass skills. She

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[30] Tony Bacon, "An Oral History of the Gibson Les Paul," *Guitar.Com* (blog), March 19, 2019, https://guitar.com/guides/essential-guide/the-oral-history-of-the-les-paul/.

[31] Shaughnessy, *Les Paul*, 202. Competition from Fender Musical Instruments also helped motivate Gibson. Fender released the first mass-produced solid-body, the Broadcaster, in 1950. The Les Paul signature guitar is a separate design from Paul's earlier experiments and was created entirely by Gibson's R&D department. Paul licensed his name to Gibson and received royalties for every guitar sold. He began playing Gibson Les Pauls exclusively on stage and television after its release and actively marketed the instrument.

[32] Culpeper, "Performing Conformity," 156-57.

[33] Shaughnessy, *Les Paul*, 149.

became a regular in the Los Angeles western music scene and eventually formed a close-harmony trio called the Sunshine Girls with Vivian Eaves and June Widener. The Sunshine Girls regularly performed on *Hollywood Barn Dance*, the west coast version of *Grand Ole Opry* and *National Barn Dance*.[34]

Summers was already an admirer of Les Paul's guitar playing in 1945 when she was introduced to him by "the singing cowboy" Gene Autry. Paul was auditioning singers for his own hillbilly radio show on NBC and was likewise a fan of her work with the Sunshine Girls and as a soloist. Shortly thereafter, she left her trio and began playing country and western music with Paul on the radio, who revived his "Rhubarb Red" moniker for their performances.[35] Sometime around 1947, as Paul's marriage to his first wife Virginia was failing, their musical relationship also became a romantic one.[36] The songs they played together were old fashioned and nostalgic, capitalizing on Hollywood's obsession with all things Western.[37] It was a far cry from the high-tech vocal pop that catapulted them to stardom in the early 1950s. Before Colleen Summers and Rhubarb Red could reinvent themselves as Les Paul and Mary Ford, however, Paul had to invent new ways of making music. In the second half of the 1940s, he began experimenting with recording technology with the same rigor as his earlier electric guitar innovations. These experiments became the New Sound that led to chart-topping success over the next decade.

NEW SOUND, NEW SYMBOLS

Les Paul was drafted into the U.S. Army in 1943 and spent the remainder of the war years at the Armed Forces Radio Service in Hollywood, playing on broadcasts that were heard by G.I.s around the world. He also worked as a technician and engineer, editing prerecorded

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[34] Ibid., 151.

[35] Culpeper, "Performing Conformity," 160.

[36] Shaughnessy, *Les Paul*, 153.

[37] Ibid., 149.

variety shows that were distributed by the armed forces.[38] His wartime performances caught the attention of Bing Crosby, who shortly thereafter invited him to stay in Los Angeles and perform on his popular radio show for NBC radio. The two became friends and in late 1945 released "It's Been a Long, Long Time" on Decca records. This gentle, stripped-down ballad showcased Paul's sparkling, melodious guitar playing and resonated with American listeners as G.I.s returned home and settled into postwar life. The song spent six months at the top of the Billboard charts.[39] Crosby gave Paul the money to set up a recording studio at his West Hollywood home, recognizing that Paul's skill with music technology, as much as his talents as a guitar player, were responsible for the success of "It's Been a Long, Long Time." The crystal-clear sound of Paul's Log guitar and Crosby's close-miked crooning created a sense of intimacy with the listener that carried across the airwaves. These techniques made full use of new technology to create recordings that were tailor-made for the private listening experiences afforded by the radio and phonograph.

The hybrid studio-laboratory-workshop that Paul built in his garage quickly became a destination for popular recording artists. Andy Williams, Perry Como, Judy Canova, and others cut records and prerecorded radio programs there, with Paul playing multiple roles as engineer, arranger, and accompanist. Meanwhile, he remained a regular fixture on live variety shows for NBC radio. His next big success after "It's Been a Long, Long Time" came with the Andrews Sisters. After recording their chart-topping "Rumors are Flying," Les Paul and his trio joined the sisters on tour, serving as both their opening act and backing band for live performances and radio broadcasts that were heard by millions around the country.

Sometime in late 1946, Paul's mother Evelyn Polsfuss inadvertently pushed her son in a new musical and technological direction. In a story that the guitarist retold (with variations) throughout his life, he either received a letter, a phone call, or a visit from his

[38] Ibid., 113-115.

[39] Ibid., 123-4.

mother while on tour with the Andrews Sisters. “I heard you on Bob Hope’s [radio] show last week,” she told him, “You were great.”[40] Unfortunately, Mrs. Polsfuss was mistaken. Les Paul wasn’t on Bob Hope’s show the previous week and his own mother was unable to distinguish his playing from Chicago guitarist George Barnes’.[41] When he returned home from tour, Paul ended his relationship with Decca records. He retreated into his studio, where he spent the next two years in relative isolation, crafting a new, inimitable sound that set him apart in the crowded arena of late-1940s pop.

While Paul was on the forefront of the postwar boom in broadcast and sound technology, the fact that his notoriety was tied to mechanical reproduction and transmission of music meant that he was at risk of being subsumed by a sea of successful imitators. It would be several years before solid-body electric guitars reached the mass market, first with Fender’s Broadcaster model in 1950, and Les Paul’s own signature model (produced by the Gibson company) two years later. Yet the problems with noise, amplification, and recordability that Paul solved with his homemade guitars were concerns shared by other electric guitar makers in the era, and luthiers like Leo Fender, Paul Bigsby, and Adolph Rickenbacker were producing similar one-off solid-bodies for popular recording artists by the mid-1940s and shared their developments with one another.[42] And despite high-profile endorsements from Bing Crosby and the Andrews Sisters, he found that he was not irreplaceable as an engineer either. Paul gained a reputation as a skilled recordist while working for the Armed Forces Radio Service, yet he was only one of a literal army of technicians working to produce and deliver high-fidelity radio programs to American troops.

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[40] Ibid., 137.

[41] Paul and Cochran, *Les Paul: In His Own Words*, 176.

[42] Ibid., 162-63; Waksman, “Pure Tones and Solid Bodies,” 46-48; Bourdage, “From Tinkerers to Gods,” 16-17.

Les Paul's personal crisis of individuation typifies the experiences of many middle-class American men in the years following World War II. Since the late nineteenth century, the use, design, and invention of machines and technologies was viewed as a masculine characteristic in American society.[43] After the war, new technologies, which once represented innovation and agency, flooded the market. The Fordist model that made mass production of these machines possible meant that thousands of men could find work building automobiles, airplanes, or refrigerators, but also ensured that no one on the assembly line had a complete understanding of how they functioned. And in the massive reorganization of American society to meet wartime production demands, even engineers, scientists, and other experts found themselves thrust into a bureaucratic system of public-private partnership with orders and design decisions coming from above. This new, hierarchical system persisted in business and industry when the country returned to producing consumer goods after the war. The maverick inventor tinkering away in his workshop had been supplanted by an army of flannel-suited engineers and research directors working in corporate, academic, and military facilities.[44]

The rapid postwar proliferation of technology and the acceleration of scientific progress made possible by mass production and the rise of "managed research" represented a threat to agency and autonomy. Technological gadgets played an increasingly significant role in everyday life, yet fewer and fewer people comprehended how these devices actually worked.[45] Meanwhile, Americans understood technology as the key to Allied success in World War II. Radar, jet propulsion, cryptography, and ultimately the atomic bomb had defeated the Axis powers, and as World War II gave way to the Cold War, scientific superiority remained essential

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[43] Ruth Oldenziel, *Making Technology Masculine: Men, Women, and Modern Machines in America 1870-1945* (Amsterdam University Press, 1999), 31; Bourdage, "From Tinkerers to Gods," 19.

[44] Ruth Schwartz Cowan, *A Social History of American Technology* (New York: Oxford University Press, 1997), 258.

[45] Pursell, *Technology in Postwar America*, 65.

for ensuring geopolitical superiority.[46] Whereas before, technology represented the mastery of men over machines, in the postwar years it came to be seen as a double-edged sword: the men and nations who failed to master technology would be emasculated and subjugated by it.[47]

Of course, Les Paul was a pop musician who spent the war making lighthearted entertainment in balmy California and his own concerns with technology were far less apocalyptic. Nevertheless, the musical direction that he took in response to his mother's case of mistaken identity and the way in which he presented this music to the public exemplify mainstream American attitudes toward technology in the postwar era. In the two years after Paul parted ways with the Andrews Sisters, he pioneered techniques to transform the recording studio from a tool for *reproducing* sound into an instrument for *producing* entirely new sounds. Unlike his earlier innovations with the electric guitar, these new techniques didn't simply solve problems with recording and performance but allowed for entirely new ways of making music.

First, he perfected *sound-on-sound* recording, which allowed him to build up tracks layer by layer instead of recording entire arrangements with a band in one take. The advent of multi-track recording, which became standard in the second half of the twentieth century, represents a schism between live and recorded music. The music on a record would no longer be a facsimile of a live performance with multiple musicians each playing a single part, but could instead be the product of a single player overdubbing multiple parts in succession. Paul's sound-on-sound recordings from the late 1940s were made using a lathe cutter that inscribed each layer of music onto shellac master discs. In order to prevent noise and distortion from accumulating as subsequent layers were added, he carefully filtered unwanted sounds using a mixing console.[48]

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[46] Walter A. McDougall, *The Heavens and the Earth: A Political History of the Space Age* (Baltimore, Md: Johns Hopkins University Press, 1997), 71; Pursell, *Technology in Postwar America*, 59.

[47] Lynn Spigel, "The Suburban Home Companion: Television and the Neighborhood Ideal in Postwar America," in *Welcome to the Dreamouse: Popular Media and Postwar Suburbs* (Durham & London: Duke University Press, 2001), 46-48.

[48] Waksman, "Pure Tones and Solid Bodies," 57.

He also recorded background parts (drums, bass, rhythm guitar) *first*, so that foreground elements would be freshly etched into the shellac and thus higher fidelity.[49] It was impossible to edit recordings once they had been committed to disc, so any errors required throwing out the entire recording and starting from scratch.

Second, Les Paul invented an electronic method for doubling sound on recordings. He attached a stylus to the same turntable that held the shellac discs for recording, which would play back sounds a split second after they were recorded. By feeding this sound back into the mixing console, Paul created an echo effect. Previously, recording studios had used microphones and speakers placed in reverberant rooms to lend acoustic realism to recordings, but Paul created an entirely artificial sense of acoustic space in his small garage using only electronic devices.[50]

Finally, he manipulated the speed of the recording lathe to alter the pitch and tempo of instruments. By doubling the speed of the turntable, he could record guitar parts that sounded an octave higher and twice as fast. By using this technique, Paul was no longer subject to the limits of his own skills as a guitarist, but could record impossibly fast scales and arpeggios that sounded unlike any known instrument.[51]

Paul emerged from his garage in 1948 with two recordings, instrumental versions of the popular 1932 song "Lover" by Richard Rogers and Lorenz Hart and "Brazil," a song by Ary Barosso that had become popular among American audiences through the 1942 Walt Disney film *Salvados Amigos*.[52] He played all of the parts on these recordings, including some percussion. "Lover" opens as a ballad, with the octave-up double-speed effect while a second, normal guitar part lays down chords with a drum beat and bass line barely audible in the

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[49] Paul and Cochran, *Les Paul: In His Own Words*, 178.

[50] Shaughnessy, *Les Paul,* 139.

[51] Brian Kane, "Acousmatic Fabrications: Les Paul and the 'Les Paulverizer,'" *Journal of Visual Culture* 10, no. 2 (August 2011): 218.

[52] Originally titled "Aquarela do Brasil," songwriter Bob Russell added English lyrics and it became known in the U.S. as simply "Brazil."

background. The two guitar parts fall into a kind of duet, trading phrases and eventually coming together for a cadence. Then the tempo abruptly shifts and an arpeggiated flurry begins with now two sped-up guitar parts in harmony. The rest of the song sounds like a runaway circus organ and showcases Paul's apparently superhuman virtuosity as he blazes through the popular standard at breakneck speed. "Brazil" is less manic, but follows a similar two-part, slow-fast structure that recalls a big band swing arrangement. Paul uses the octave-up effect to create a syncopated staccato accompaniment.

He signed a contract with Capitol Records, who released "Lover" as a single with "Brazil" as its B side. Capitol marketed these recordings as "The New Sound," a phrase that Paul used to describe his music for the next decade.[53] Indeed, the technological novelty of these songs is the point. Paul was not motivated by aesthetic concerns and his arrangements of "Lover" and "Brazil" are remarkably conservative.[54] Primarily melodic, there is no evidence of Paul's background as a jazz guitarist and only the faintest vestiges of Latin American rhythm in "Brazil." Instead, they showcase Les Paul the *inventor* presenting new sounds with the accessible vocabulary of pop music. "Lover" and "Brazil" performed well commercially, reaching number 21 and 22 on the *Billboard* charts. Even jazz purists writing for *Down Beat* scoffed at his overuse of musical clichés, but praised the record as "a technical achievement" that succeeded in setting him apart among American pop artists through sound alone.[55]

Capitol released the first two "New Sound" recordings in 1948 while Les Paul recouperated from a car accident that almost destroyed his right arm. Unable to produce new material while he recovered, Capitol put out a number of other singles Paul had created during his creative isolation.[56] These tracks were eventually collected into an extended-play

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[53] Shaughnessy, *Les Paul,* 143.

[54] Waksman, "Pure Tones and Solid Bodies," 58.

[55] Zak, *I Don't Sound like Nobody*, 68.

[56] Shaughnessy, *Les Paul,* 169.

compilation called *The New Sound* in 1950. Meanwhile, Bing Crosby invested in the Ampex Electric and Manufacturing Company, an early American manufacturer of reel-to-reel tape machines. Crosby recognized tape's superior audio quality and its ease of editing (compared to record lathes) and gave Les Paul an Ampex Model 300 tape recorder as a get-well gift. Paul, who had painstakingly developed sound-on-sound recording with a disc cutter, initially found this technique more difficult with tape, but he quickly modified the machine to facilitate overdubbing and came to appreciate the portability of the new medium.[57]

The cleverness of his overdubbed-guitar instrumentals continued to have commercial appeal throughout 1948 ("What is This Thing Called Love?" topped "Lover" in record sales), but critics became increasingly weary of his clichéd musical arrangements. *Metronome* magazine recognized that Paul's new recording techniques would have a lasting impact on the way records would be made, but doubted that studio trickery alone would lead to long-term success.[58] Executives at Capitol pressured him to form a female-fronted band like the Andrews Sisters and abandon his garage experiments. Paul was unwilling to relinquish control over arrangements and go back to recording in other studios with bandmates, but he understood the need to broaden his appeal beyond novelty instrumentals.

Colleen Summers had been known as a country and hillbilly singer and Paul initially worried that her voice would be too folksy and old-fashioned for the modern New Sound.[59] But through their radio performances together, he realized her talent behind the microphone and her understanding of the recording process. Harmony parts came naturally to Summers from her experience singing church music with her siblings and close harmony with the Sunshine Girls; this was a skill that would be invaluable for the richly overdubbed music Paul intended to make.[60]

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[57] Ibid., 180-81.

[58] Zak, *I Don't Sound like Nobody*, 68.

[59] Shaughnessy, *Les Paul,* 170.

[60] Culpeper, "Performing Conformity," 159.

Most of all, she was a pliant and submissive musical partner who Paul could trust to be the voice of his new sound. "She was a raw bundle of talent in need of shaping. He was looking to lead, she was looking to follow," wrote biographer Mary Alice Shaughnessy.[61]

Prior to their official duo debut, radio listeners only knew Rhubarb Red as Summer's musical partner. In order to perform with his jazzman-turned-pop artist alter ego Les Paul, he decided she would have to change her name to shed its hillbilly associations. He picked "Mary Ford" out of a Milwaukee telephone book because it sounded fresh and modern.[62] The two took the stage together for the first time in the summer of 1949 at Club 400 in Waukesha, which was owned by Paul's father, George Polsfuss.[63] They married in Milwaukee in December of that year.

Les Paul and Mary Ford's meteoric rise began immediately upon their return to Los Angeles. They began churning out singles for Capitol records in the garage studio. Their songs, including "Nola," "Little Rock Getaway," and "Tennessee Waltz," crept higher and higher on the pop charts over the course of 1950. Paul was offered his own weekly program, *The Les Paul Show with Mary Ford* on NBC radio.[64] They prerecorded the fifteen-minute episodes at home and developed their signature act, where Ford sings while doing household chores as Paul tinkers with his electronics. Their recording regimen did not slacken when they set out on the road to play at packed venues across the country. Paul and Ford would record in hotel rooms using the portable Ampex reel-to-reel machine and headphones, and mail tapes back to Los Angeles.[65] In early 1951, they finally scored their first number-one hit with their pop rendition of the jazz standard "How High the Moon."[66]

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[61] Shaughnessy, *Les Paul,* 151.

[62] Paul and Cochran, *Les Paul: In His Own Words*, 198.

[63] Shaughnessy, *Les Paul,* 172.

[64] Ibid., 179.

[65] Ibid., 181-2.

[66] Ibid., 188.

The New Sound was a hot commodity, and through the use of technology, Les Paul gained an advantage over his competitors. He and Mary Ford became best-selling pop artists in the early 1950s by packaging familiar songs in a sonic language that signaled technological and scientific progress. The duo drew their repertoire from a wide range of sources—jazz, country, blues, Hawaiian and Latin American music—but carefully avoided being pigeonholed by any genre label other than "pop." Instead, they distilled these elements into a maximally-accessible musical formula designed to appeal to middle-class, white America. According to music historian Steve Waksman, this formula was successful "not because of the absence of foreign elements, but because of its power to purify those elements while incorporating them into its substance."[67] Just as this purification process defanged the ethnic and class markers of blues, hillbilly music, and other styles, it also neutralized the threat represented by technology in American life. The technologically-mediated New Sound was new indeed, but the music itself was safe and familiar.

The popularity and commercial success of the New Sound reflects cultural attitudes toward high-tech commodities in postwar America. Americans knew that science had won the war, but scientific research had become so complex, decentralized, and esoteric that only a small handful of experts actually understood how things like nuclear physics, jet propulsion, or electromagnetic radiation actually works. Yet American companies were turning out products that made use of scientific advances and wanted consumers to purchase their products and services. To counter potential feelings of fear and alienation posed by the inscrutability of modern science, advertising and popular media was used to shift the focus away from science and onto the commodities made possible by technological processes. The result, according to historian Michael L. Smith, was a kind of "commodity scientism" in which high-tech consumer products became symbols of science itself.[68] The national

[67] Waksman, "Pure Tones and Solid Bodies," 72.

[68] Smith, "Selling the Moon," 179.

narrative of peace, prosperity, and geopolitical superiority through scientific progress was grafted onto objects that could be bought and sold.

Scientism was an effective marketing tactic, since most people were ignorant of the actual technological processes at work in their consumer goods. As a result, "commodity scientism…meant the eclipse of technological literacy by an endless procession of miracle-promising experts and products."[69] By citing the purported scientific qualities of products, advertisers could endow commodities with almost magical qualities. The Listerine ads that bisected each episode of *Les Paul and Mary Ford At Home* equate antiseptic mouthwash with a woman's ability to find a husband and maintain a happy marriage. By packing promotional literature with pseudoscientific technobabble like "Level-Flite Torsion-Aire suspensions," "Automic Eyes," and "three-dimensional driving," car makers could convince prospective buyers that they would be driving a highly sophisticated machine befitting the atomic age.[70] Even advertisements for the Gibson Les Paul guitar touted features like a "double combination Tune-O-Matic bridge and tailpiece" that provides "a new high in sustaining tone quality and precision pitch adjustment" and a switching mechanism with "the widest range of tonal offerings."[71]

Maintaining the ruse that commodities possessed transcendent, almost magical power required keeping the public in the dark about the actual technological processes they used. This is why Les Paul developed his New Sound in private and only consulted with a few trusted friends on technical matters.[72] When Capitol released "Lover," they emphasized the inscrutability of his process in press releases, writing, "How he does it has even Capitol's

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[69] Ibid.

[70] Ibid, 186.

[71] Tony Bacon, "An Oral History of the Gibson Les Paul," *Guitar.Com* (blog), March 19, 2019, https://guitar.com/guides/essential-guide/the-oral-history-of-the-les-paul/.

[72] In particular, his friend Wally Jones in particular was responsible for building and repairing many of Paul's custom-designed electronics. Paul and Cochran, *Les Paul: In His Own Words*, 178-179.

veteran engineers baffled, and Les isn't letting the secret out!"[73] Paul, of course, wanted to fend off imitators, but promoting the New Sound as confounding even to experts helped convince consumers that his music represented a groundbreaking technological achievement.

Secrecy was strategically important during World War II and shaped how many Americans came to understand scientific progress. Large-scale logistical endeavors like the Manhattan Project took place entirely outside of public view and even most people who worked on the project were kept in the dark about its ultimate aims.[74] The atomic bombs that exploded over Japan in 1945 made the world aware of the longterm research project but even then, few in the public actually understood the power of atomic energy. The need for secrecy only increased with the Cold War and the Space Race, and the fates of spies like Julius and Ethel Rosenberg underscored that secrecy was a central component of technological development. Science was something that took place in the shadows and only paradigm-shifting events like the bombings of Hiroshima and Nagasaki or the launch of Sputnik alerted the public that a breakthrough had taken place. The veil of secrecy surrounding military research meant that the government could sculpt the public narrative and symbolism of new technologies. After the war, nuclear power was swiftly rebranded as an instrument of peace through government initiatives like Project Plowshare and films distributed by the Atomic Energy Commission.[75]

Les Paul and Mary Ford's New Sound hardly amounted to a closely-guarded state secret, yet by cultivating a playful air of mystery surrounding their techniques, they highlighted Paul's technological innovations in a way that was familiar to Americans in the early postwar years. The acousmatic medium of radio was helpful for building mystique. In "live" broadcast performances, the duo would perform along with prerecorded tracks and claim that "Mary sings three parts at

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[73] Shaughnessy, *Les Paul,* 143.

[74] Pursell, *Technology in Postwar America*, 60.

[75] Smith, "Advertising the Atom," 244–45.

once…and Les plays seven guitars."[76] Record sleeves and promotional photographs depicted Paul as a multi-limbed Hindu deity holding several guitars at once. To explain the octave-up effect creating by doubling the recording speed, they concocted a tiny, imaginary guitar, "eighteen inches long…and tuned about an octave higher than a big, standard guitar."[77]

Perhaps the most effective fabrication was a fictitious invention called the Les Paulverizer. This device, which debuted on Paul's radio show in 1950, could purportedly "multiply" sounds so that when Mary sang or Les played into it, a chorus of voices and guitars would instantly be created. The Les Paulverizer was an effective gag and became a recurring element of their radio broadcasts.[78] It highlighted Paul's tinkerer-inventor persona while also making the technological trickery of the New Sound seem instantaneous and effortless, when in reality it remained a laborious process of careful overdubbing.

These guises worked on the radio, but it proved difficult to translate the New Sound to the stage. Mary's sister Carol was often enlisted to sing into a microphone behind the curtain to add an additional, hidden layer of vocals.[79] Gibson actually built Paul two half-size, mandolin-like versions of his signature guitar so that he could play some of the pitch-shifted parts live.[80] But the New Sound, in all of its multi-tracked glory, was the duo's calling card, and audiences came to shows expecting to see the Les Paulverizer and hear the sounds they had heard on record. To satisfy demand, Paul built a real Les Paulverizer. The real device couldn't actually transform the duo entire a twelve-piece chorus, of course. Instead, it was a small remote control that attached to the body of his guitar that allowed him to control tape machines hidden backstage. Paul and Ford, in essence, presented prerecorded songs on stage

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[76] Kane, "Acousmatic Fabrications," 219.

[77] Ibid.

[78] Ibid., 223.

[79] Ibid., 222.

[80] Paul and Cochran, *Les Paul: In His Own Words*, 245.

but the technological mystery of the Les Paulverizer that they had developed on the radio was again deployed to keep their true methods a secret. The duo used the Les Paulverizer when they performed for President Eisenhower and his wife at the White House in 1956. Paul reportedly received a letter from Vice President Richard Nixon telling him that their performance left Eisenhower as perplexed and befuddled as the "veteran engineers" at Capitol Records.[81]

These increasingly elaborate fabrications, which began as radio gimmicks before making their way into the real world, were presented in a lighthearted, even tongue-in-cheek way. But they served the very real purpose of keeping other musicians from imitating Les Paul's sound. They were a means of ensuring that he retained complete control over his new techniques. At the same time, they helped associate the self-consciously artificial New Sound with technology, since Americans in the 1950s were accustomed to secrecy surrounding scientific breakthroughs. Paul and Ford performed technology in a way that white, middle-class postwar America understood. Their jejune performances of tried and true pop standards combined with the mystery of how they achieved their signature sound allowed Paul, as well as critics and promoters, to project meaning onto Les Paul and Mary Ford. This music was high-tech and modern, but it also symbolized that technology would not threaten to significantly upset the familiar conventions of American pop music.

MY BABY'S COMING HOME[82]

Everything about Les Paul and Mary Ford's public relationship was mediated by technology and invention. They first heard each others' music on Los Angeles radio stations before teaming up for broadcast performances together. He added her to his act to transform

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[81] Richard Buskin, "Classic Tracks: Les Paul and Mary Ford 'How High the Moon,'" *Sound on Sound*, January 2007.

[82] Written by William Leavitt and John Grady, Paul and Ford released "My Baby's Coming Home" in 1952. It reached number seven on the U.S. pop charts.

the New Sound from a novelty instrumental gimmick into the much more lucrative and popular genre of vocal pop. Her voice received the same treatment as his electric guitars on their recordings, overdubbed, delayed, and transformed through the use of recording technology. Even the persona "Mary Ford" was an invention. When Colleen Summers became Mary Ford she set aside the reputation she had developed as a hillbilly musician to transform into the glamorous yet demure housewife archetype popularized by other 1950s pop musicians like Doris Day and Peggy Lee.[83] Whereas "Colleen Summers and Rhubarb Red" symbolized the homespun, nostalgic traditionalism of country music, "Les Paul and Mary Ford" signaled modernity, conspicuous commercialism, and suburban wholesomeness.

They were not coequal partners in their musical collaboration. The New Sound that set their music apart was shorthand for the inventions and studio techniques that Paul developed alone in his garage laboratory. Mary Ford entered into *his* musical space—literally and figuratively—when she joined his act and though Paul praised Ford's musicianship after her death, he routinely downplayed any creative role she played during their time together.[84] She was a formidable guitarist and ostensibly the frontwoman of the duo, yet the routines they performed on air and on stage ensured that the focus remained on his instrumental and technical virtuosity. One recurring bit involved Paul and Ford trading increasingly complex guitar solos before he unplugged her instrument lest she one-up him on stage.[85] This gimmick was a showcase for her guitar skills and surprised audiences (since it was Colleen Summers, not Mary Ford who was known for her instrumental ability), but it also made clear to the public that Paul could silence her whenever he wanted to. Episodes of the *Les Paul and Mary Ford at Home* television show all followed the same format that likewise kept Paul at the center of

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[83] Lucy O'Brien, "Stupid Cupid: Dream Babes in 1950s Pop," in *She Bop: The Definitive History of Women in Rock, Pop and Soul II* (London: Continuum, 2002), 39, 43; Waksman, "Pure Tones and Solid Bodies," 60.

[84] Paul and Cochran, *Les Paul: In His Own Words*, 307.

[85] Waksman, "Pure Tones and Solid Bodies," 61; Shaughnessy, *Les Paul*, 196.

viewers' attention. Following a brief introduction, she sings a song while he accompanies (typically with guitar solos sprinkled liberally throughout). Then, after a Listerine ad, Paul performs an instrumental while she watches silently.

Their joint public persona encapsulated the complex relationship between technology and gender roles in the postwar era. This dynamic is further complicated by the fact that the couple worked at home and consistently drew attention to their marriage and home life in broadcast performances during the peak of their success. Technology profoundly altered American domestic space in the postwar era and the home was frequently the site where cultural attitudes toward technology were shaped. Les Paul and Mary Ford, in their quest for widespread appeal, performed technology and marital dynamics at home in a way that suburban Americans understood in the early 1950s.[86]

The duo made a career producing lighthearted commercial entertainment—music for leisure-time listening. On radio, and later on television, they projected the idea that their music was *created* in leisure as well. This was, of course, an act, and Mary Ford in particular grew increasingly exhausted by the demands of constant recording and touring as the 1950s wore on.[87] Nevertheless, they consistently maintained a façade of effortlessness made possible through Paul's mastery of technology and Mary's natural talent. The Les Paulverizer was concocted to give the impression that making the New Sound was as simple as singing into a machine. The skeletal plots of their broadcast performances present the couple in a state of perpetual relaxation by barbecuing on the patio, playing cards, or preparing for a party in a tux and evening gown. Domestic leisure signaled financial stability—luxury, even—and their performance of productive idleness was something their middle-class audience aspired to.[88]

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[86] Culpeper, "Performing Conformity," 167.

[87] Shaughnessy, *Les Paul*, 227-228.

[88] Bourdage, "From Tinkerers to Gods," 23.

Yet the notion of leisure time changed significantly in the years following World War II and is closely linked to the reconceptualization of gender roles and division of labor. The economic boom of the postwar years resulted in a strict division of public and private spheres; men worked in business and industry while women became responsible for maintaining the home. This was seen as a return to normalcy following the period in which millions of women worked in factories to support the war effort while men were overseas. However, the postwar division of spheres became even more rigid than it had been before the war. New technologies like the refrigerator and central heating had replaced household duties previously performed by men (like filling the icebox or chopping wood for a heater), so the amount of male domestic work was reduced, while the number of women's duties stayed the same or increased.[89] But "homemaking," since it was not regimented and professionalized, was not conceived of as "work," but rather than necessary and invisible maintenance of a happy home and productive family.[90]

Meanwhile, the expansion of assembly-line work and the bureaucratization of white collar jobs meant that men's professional lives were "increasingly superfluous to their sense of self."[91] Because of this, leisure time at home became the place for American men to find a sense of identity and autonomy. Since men's professional lives were structured by work schedules, their leisure time took on an official character as well. Evenings and weekends could be devoted to self-expression and the pursuit of knowledge through hobbies and do-it-yourself projects.[92] For women, however, the boundary between work and leisure was more nebulous and the two

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[89] Keir Keightley, "Low Television, High Fidelity: Taste and the Gendering of Home Entertainment Technologies," *Journal of Broadcasting & Electronic Media* 47, no. 2 (June 2003): 251; Ruth Schwartz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic Books, 1983).

[90] David Riesman, Nathan Glazer, and Reuel Denney, *The Lonely Crowd: A Study of the Changing American Character* (New Haven and London: Yale University press, 1989), 262.

[91] Keightley, "'Turn It down!'," 153-54; Keightley, "Low Television, High Fidelity," 251.

[92] Keightley, "Low Television, High Fidelity," 252.

frequently overlapped.[93] Daytime television programming in the 1940s and 50s was directed towards housewives, under the assumption that they would be at home participating in a leisure activity (watching television) while doing chores. Advertisers pushed products that appealed to wives and mothers, but programs themselves were also structured to not distract women from their work. Soap operas, in particular, frequently recapped plots, repeated dialogue, and used a minimum of visual elements so that women could follow them even as their attention was devoted to other tasks.[94]

Les Paul and Mary Ford's on-air performance of their domestic life reflects this bifurcated conception of the home. Paul, who really did find his own musical identity in his Hollywood garage, performs the role of the hobbyist tinkerer constantly experimenting with musical electronics in his free time and sharing the musical results with listeners.[95] On *The Les Paul Show with Mary Ford* radio program, he tells jokes, shares ideas for new inventions, and engages in playful banter with his wife. Both Paul and Ford seem at ease and project a sense of domestic leisure, both through their music and their conversation. Yet throughout all of the radio shows, Mary Ford makes repeated references to household work, signaling that she is never fully at rest in the home. After a Les Paulverizer-related joke about how her husband (who had just made six guitars out of one) eats like six people, she reminds Les that he needs to fix the stove so she can make dinner.[96] Later she claims that he "got the washing machine and the garbage disposal wires mixed up," to which he replies, "it was the cleanest garbage in the neighborhood!"[97] These lighthearted jokes simultaneously draw attention to Mary Ford's split persona as both a singer and a housewife, while reinforcing Les Paul's long-established unified

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[93] Lynn Spigel, *Make Room for TV: Television and the Family Ideal in Postwar America* (Chicago: University of Chicago Press, 1992), 72.

[94] Ibid., 78.

[95] Waksman, "Pure Tones and Solid Bodies," 59.

[96] *The Les Paul Show with Mary Ford*, July 11, 1950.

[97] Ibid.

persona as an electronics tinkerer, since the extent of his household duties mentioned on air consists of fixing appliances for his wife.

The dichotomy between how Paul and Ford spend their time at home is made even more explicit in their visual performances on television and in press images. She is frequently depicted on screen doing other tasks while they play music together—organizing photos, unloading groceries, polishing a dish, or preparing hors d'oeuvres for a party.[98] In contrast, Paul enters every episode with his namesake Gibson guitar in hand and never puts down the instrument, even when he's seen tending to a barbecue grill.[99] A photograph published in *Newsweek* shows Mary and her sister Carol standing in the kitchen. Carol is doing dishes as Mary sings into a microphone. Paul, seated, plays guitar in another room.[100] In their performance of domestic space, Paul is always able to be fully enmeshed in his music, but Ford, the housewife, must always divide her attention between their music and some other household task.

The gendered division of spheres and the differing conceptions of male and female labor also shaped the perception of domestic technologies. Devices related to women's work, like the washer, stovetop, or fridge, were dubbed "appliances," removing the associations of autonomy and agency associated with "technology" or "machines."[101] Keir Keightley has studied how these gendering effects extended to home entertainment technologies as well. 1950s television sets were pieces of furniture designed to blend seamlessly into the feminine, private sphere of the home. Since viewers exerted no agency over what was broadcast, the television came to symbolize domestication and passivity and thus became associated with women.[102]

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[98] *Les Paul and Mary Ford At Home* (TV Show), Internet Archive, https://archive.org/details/LesPaulMaryFordMisc9.

[99] Paul and Cochran, *Les Paul: In His Own Words*, 264.

[100] Waksman, "Pure Tones and Solid Bodies," 65.

[101] Keightley, "Low Television, High Fidelity," 253.

[102] Ibid., 243.

Conversely, the high fidelity stereo system offered the listener control over the records he played, and the postwar era saw the rise of record collecting and audiophile magazines. The hi-fi let men tweak and tinker with electrical components in pursuit of perfect tone, just like Les Paul in his studio. Audiophile culture was entirely male dominated in the 1950s. Men's magazines like *Playboy* explicitly depicted the hi-fi as a means of reclaiming masculine space in the domestic sphere,[103] while women's publications like *Home Beautiful* lamented their deafening volume levels and control panels that looked like "an ocean liner's engine room."[104] Audiophile technology offered men the opportunity to engage in productive leisure, unlike the television, which only encouraged passive consumption.[105] In an age when mass production was turning most technologies into inscrutable black boxes, a modular stereo system allowed men to imagine themselves as engineers in their free time, presiding over a mess of speakers, amplifiers, wires, and, by extension, their homes.[106]

The distinction between what did and did not constitute technology in the postwar suburban home was a matter of agency and control. Since this distinction fell along gender lines, technology had the potential to be an emasculating force for men who were controlled by technology instead of controlling it. In his discussion of *commodity scientism* and the technoscientific revolution that followed World War II, Michael Smith identifies a "helmsman" archetype that emerged in advertising and popular media. Like Captain Nemo aboard the *Nautilus* or Charles Lindberg piloting the *Spirit of St. Louis*, the helmsman is completely integrated into the machine, yet is not bound by it. Instead, the machine does his bidding and

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[103] Keightley, "'Turn It Down!'," 154-55.

[104] Ibid., 162-63.

[105] Bourdage, "From Tinkerers to Gods," 23.

[106] Ironically, televisions of the 1950s, with high-voltage vacuum and cathode-ray tubes, were much more complex and dangerous technologies than most stereo sets, which helps explain why men did not tinker with televisions as a hobby. Servicing a television typically required calling a professional. Keightley, "Low Television, High Fidelity," 253.

he can exert greater agency over his environment by extension.[107] This is seen in automobile advertising of the era, which touted the capabilities of the vehicle while highlighting features that offer the driver greater control over the machine.[108] The helmsman was effective because he assuaged fears about the feminizing threat posed by technology, while also reinforcing the gender dynamics of the postwar era. Rather than supplanting male agency, the power of new technologies would augment it.

Les Paul was the helmsman of the New Sound and his radio broadcasts with Mary Ford reinforce the image of Paul as a man surrounded by machines yet completely in control of them. In the introduction of a 1950 broadcast, he tells audiences, "This program comes from our home. I have a room here just loaded with electronic gadgets: amplifiers, echo chambers, transformers, 6L6s…" Mary Ford cuts him off: "Let me tell them, Les—you're a genius! Anyone who can make one guitar sound like six is a genius!" He pretends to downplay her praise, claiming "any guy could do it" and "all I do is tinker around." But Ford insists, repeating the word "genius" several more times before he acquiesces.[109] Ford's role in this skit transfers the powers of Les Paul's "gadgets" onto Les Paul the man. His wife, who became a part of Les Paul's act to broaden the mainstream appeal of the New Sound, plays the role of an idealized listener in Paul's imagination. She knows that his machines are responsible, in part, for his music but is so in awe of the sound and overwhelmed by its technical complexity that she chooses to believe that Les Paul is simply a "genius."

But it was not enough to just present Paul as a helmsman with agency over his musical machines. Despite his claim that "any guy could do it," it was necessary to reinforce the idea that his electronics could be dangerous in the wrong hands, and again, Mary Ford was called upon to play this role. A radio episode titled "The Case of the Missing Les Paulverizer" begins with an

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[107] Smith, "Selling the Moon," 184.

[108] Ibid., 186.

[109] *The Les Paul Show with Mary Ford*, July 11, 1950.

unusual guitar solo, free of any overdubs or effects. It is revealed that Mary Ford has taken the Les Paulverizer (which in this iteration is described as a backpack strapped to the user) and is making her own vocal harmonies, even dubbing it the "Mary Forderizer." Paul becomes irate with her, insisting that she doesn't know how to do it and has changed all of his carefully-calibrated settings. "I wonder if Edison or Benjamin Franklin ever went through a thing like this?" he asks, slyly inserting himself into the pantheon of American inventors. Suddenly the machine starts to smoke and Mary cries out for Les to rescue her. After Ford is disentangled from the contraption, Paul scolds her and makes her promise to "never again fool with my inventions."[110]

At the end of the episode, Ford explains why she took the Les Paulverizer: "I thought if it could make one guitar sound like six, I could plug in my new Hoover vacuum cleaner and clean the house six times faster."[111] Ford managed to briefly usurp the magical power of the machine, but this flirtation with technology quickly spiraled out of control. She is constrained, literally, by technology and needs her husband to rescue her. And when her motivations for using the device are revealed, they reinforce her characterization as a dutiful housewife who saw the Les Paulverizer as simply an appliance. Ford's failure to see the distinction between feminine appliances and masculine technology was almost her undoing. This remarkable episode demonstrates how technological agency became constructed along gender lines in popular media of the postwar era.

A 1956 Gibson ad reads "The perfection demanded in all his equipment by Les Paul, the original hi-fi enthusiast, is incorporated in the Gibson Les Paul guitar."[112] Paul's reputation as the "original hi-fi enthusiast" was cemented by 1953 when he and Mary Ford moved into a house in Manwah, New Jersey designed by Paul himself. Described as "a

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[110] *The Les Paul Show with Mary Ford*, "The Case of the Missing Les Paulverizer," https://www.youtube.com/watch?v=27W-p3zmjHs

[111] Kane, "Acousmatic Fabrications," 223.

[112] Advertisement in *Fretted Instrument News*, October-November 1956. https://www.vintageguitarandbass.com/adDetails/456

monument to the new sound," every room in the house was wired to a central control room outfitted with a one-of-a-kind Ampex eight-track tape recorder.[113] Les Paul installed a radio transmitter and had a two-story echo chamber cut into an abutting mountain. The home itself, in addition to the studio, was luxurious, but domestic life with Mary Ford was clearly an afterthought. Hi-fi magazines described it as a studio at heart surrounded by living quarters.[114] Steve Waksman wrote that with the Manwah home, "Paul achieved a reorganization of domestic space of which other men might only dream."[115]

Paul and Ford may have played their roles of eccentric musical husband and supportive housewife equally on radio and television, but in reality their life at home was organized entirely around a postwar male fantasy of domestic space. A *Saturday Evening Post* profile of their new home tells how Paul took Ford's household duties into account when designing it, even going so far as to install a microphone and headphones above the sink so that she could sing while doing dishes.[116] Technology brought them together when they first heard each other on Los Angeles radio stations, but the stark gender imbalance brought about by living in Les Paul's technological fantasy, and the sharply divergent conceptions of male and female domestic technology threatened to pull them apart. Ford continued to play her role of doting wife for several more years, but even by 1953 she was struggling under the strain of constant recording and touring.[117] There are few photos of them from this period that do not also include an electric guitar or some other form of music technology. The tools that brought them together for the New Sound seemed to increasingly get between them. The 1956 Gibson ad shows them in the control room of the Manwah studio. Paul is in the foreground with his

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[113] Shaughnessy, *Les Paul*, 210-11.

[114] Waksman, "Pure Tones and Solid Bodies," 64.

[115] Ibid.

[116] Ibid.

[117] Shaughnessy, *Les Paul*, 217.

guitar. Behind him is a desk full of recording gear. In the background is Ford, dwarfed by equipment, holding a headphone to her ear and smiling while singing.[118]

VAYA CON DIOS

Paul and Ford continued to have success through the mid-1950s, including the 1953 number-one hit "Vaya con Dios," which became their signature song. But once rock 'n' roll arrived on the scene, their genteel vocal pop and covers of old standards quickly sounded passé and they slipped precipitously in the pop charts. Ironically, rock 'n' roll guitarists embraced solid-body guitars for their ability to create distortion and noise, the very flaws that Les Paul sought to overcome with his early guitar designs.[119] By the middle of the decade, multi-track tape recorders were commercially available, which made the techniques Paul had developed in the late 1940s available to other studios. The New Sound was no longer new.

Ford began drinking early in their career together to cope with stage fright and the pressures of touring. By 1953 she was consuming vodka regularly and suffering from malnutrition due to constantly eating on the road.[120] She became pregnant in 1954 and gave birth to a daughter who died two days later; she was recording with Paul the day she went into labor.[121] Over the coming years, she gained weight, took diet pills, and contracted hepatitis from weight-reducing shots.[122] Their marriage became increasingly strained, often erupting into violent fights. Ford fled from their New Jersey home in 1963, beginning a long, acrimonious

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[118] Advertisement in *Fretted Instrument News*, October-November 1956. https://www.vintageguitarandbass.com/adDetails/456

[119] Shaughnessy, *Les Paul*, 226.

[120] Ibid., 212.

[121] Ibid., 219-220.

[122] Ibid., 227.

divorce that undid the public image of a wholesome, happy couple that they worked to cultivate.[123] She moved back to California and died of complications from alcoholism in 1977.

In the brief period when Les Paul and Mary Ford were sitting on top of the world as the country's musical sweethearts, American culture was being pulled in different directions. Technology symbolized progress and offered promises for a new and different future. But at the same time, Americans longed for a return to traditional gender roles and the stability of home after the disruptions of World War II. The rigid separation of spheres brought on by reorganization of labor was swiftly complicated by the gendering effects of technology in the home. Les Paul rode a wave of enthusiasm for all things futuristic with his New Sound, and his performance of domestic conformity with Mary Ford appealed to many Americans. But his attempts to maintain exclusive control over technology in an age of rapid technological development were untenable, and the personal crises brought on by an unbalanced conception of the role of technology in domestic space strained his most important musical and personal relationship. "Just like Humpty-Dumpty, I'm going to fall," goes the chorus of "I'm Sitting on Top of the World." Les Paul's legacy lives on in the guitar that bears his name and the recording techniques he developed, but the New Sound was a product of a unique postwar cultural climate that quickly fell out of fashion as the 1950s progressed.

[123] Ibid., 250-1.

Technology, Music, and Blackness: Racial uplift in Sun Ra's Myth Science

A false truth and a true-myth
Are not necessarily equal.
Through the wisdom of experience
One learns what the two are
In proportionness.

– Sun Ra[1]

INTRODUCTION

On October 4th, 1957, the Soviet Union launched Sputnik 1 into orbit around planet Earth. This polished metal orb, twenty inches in diameter, beamed short blips to radios on the planet's surface and could be seen twinkling against the night sky around the globe. Its battery died after three weeks and mankind's first foray into space burned up in the atmosphere shortly thereafter. After a series of embarrassing failures, the United States responded by launching Vanguard 1 in March 1958.

On that Friday night when Sputnik first streaked across the sky, composer, keyboardist, and bandleader Sun Ra (1914-1993) was likely leading his band, the Arkestra, at a small club on the South Side of Chicago called Budland, where they had a regular playing engagement. A few months earlier, the Arkestra had released their first album, *Super-Sonic Jazz*, on Sun Ra's independent record label El Saturn.

The South Side of Chicago, once a Black Metropolis that attracted thousands of African Americans during the Great Migration of the previous decades, was left behind as the United States and Soviet Union entered the Space Race. Crumbling and in disrepair, historically Black neighborhoods were demolished to make way for highways and high-rise apartments as

[1]"The Farther Planes" (poem) in Sun Ra, *The Immeasurable Equation: The Collected Poetry and Prose*, ed. James L. Wolf and Harmut Geerken (Waitawhile, 2005): 166.

businesses shuttered, unable to secure loans and insurance due to discriminatory lending practices. Many Black Chicagoans questioned why the United States spent so much to beat the Soviets in the race to space while Black families throughout American struggled in poverty.[2]

Yet at Budland, the Black musicians of the Arkestra performed compositions by Sun Ra that extolled the virtues of space travel. They donned futuristic costumes with blinking lights as they played numbers like "Tapestry from an Asteroid," "Saturn," and "New Horizons." The Arkestra's enthusiasm for space travel, however, differed markedly from that found in the white press. Ra's vision of space exploration presented outer space as a utopia awaiting Black Americans who joined in his cosmic vision.

Outer space loomed large in the American consciousness in the years following World War II. Born out of Nazi rocket technology and advances in computing, the space program represented scientific progress that would radically transform American society. Yet before Sputnik, actually reaching outer space remained a fantasy, a powerful cultural myth onto which white and Black Americans projected their own fears, hopes, and dreams for the future. This allowed Sun Ra to reconceptualize the technology of space travel as one that served the needs of African Americans.[3]

Sun Ra believed that the forces that barred Black Americans from the technoutopian promises of the Space Age were a mistake of history. With the Arkestra, he set out to educate audiences about a long and noble Black lineage that stretched backwards to Ancient Egypt and upwards to the stars. Later scholars have identified aspects of *afrofuturism* in Sun Ra's work due to his afrocentric amalgamation of historical and futuristic themes. Ra articulated a unique positionality toward technology that rejects an essentialist distinction between Blackness and

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[2] Lynn Spigel, "Outer Space and Inner Cities: African American Responses to NASA," in *Welcome to the Dreamhouse: Popular Media and Postwar Suburbs* (Durham & London: Duke University Press, 2001), 156-158.

[3] Paul Youngquist, *A Pure Solar World: Sun Ra and the Birth of Afrofuturism* (Austin: University of Texas Press, 2016), 135.

scientific progress.[4] Through the "wisdom of experience" gained during his early life in Birmingham, Alabama, Ra viewed modernization as an opportunity for racial uplift. This worldview put him at odds with other artists and activists in 1950s Chicago, yet his novel synthesis of Black radical thought with earlier uplift philosophies set his work with the Arkestra apart and has been a powerful influence on later afrofuturist artists, writers, and scholars.[5] This chapter traces the development of Sun Ra's "Myth Science" philosophy and focuses on the influence of nineteenth-century racial uplift initiatives on his musical work with the Arkestra.

Sun Ra and His Arkestra

Sun Ra assembled the Arkestra in Chicago in the mid 1950s and the group remained the primary vehicle for his mature cosmic-utopian musical vision until his death in 1993.[6] Billed variously as "His Astro-Solar Infinity Akrestra," "The Alter Destiny 21st Century Omniverse Arkestra," "His Myth Science Arkestra," and numerous other monikers, it was with this ensemble that Sun Ra synthesized the disparate musical and cultural experiences that shaped his early life in Chicago and Birmingham.

The Arkestra itself was a musical anachronism. It featured a rotating lineup of between twelve and twenty players at time—a big band in the heyday of streamlined bebop and cool jazz combos. More than one hundred musicians played in the Arkestra throughout its tenure, and some, like saxophonists Marshall Allen, John Gilmore, and Pat Patrick remained with the group for decades. Sun Ra directed the group from the piano like his idol and mentor Fletcher Henderson, whose arrangements exemplified the jazz orchestra sound of the 1920s and 30s. The group evoked big band swing in more than just instrumentation, however. Arkestra albums

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[4] J. Griffith Rollefson, "The "Robot Voodoo Power' Thesis: Afrofuturism and Anti-Anti-Essentialism from Sun Ra to Kool Keith," *Black Music Research Journal* 28, no. 1 (April 2008): 83–109.

[5] Daniel Kreiss, "Performing the Past to Claim the Future: Sun Ra and the Afro-Future Underground 1954-1968," *African American Review* 45, no. 1/2 (Spring/Summer 2012): 200.

[6] The Arkestra continues to perform and record under the leadership of longtime member Marshall Allen. I write about the Arkestra in the past tense to focus on the era in which Sun Ra led the group.

and performances juxtaposed percussive free-jazz freakouts, heartfelt arrangements of jazz standards, trance-like chants about space travel, and musical theater numbers.

Sun Ra innovated within the large ensemble format, even as mainstream jazz of the era moved away from ensemble playing in favor of solo improvisation. He was explicit about connecting the Arkestra's experimentalism with earlier jazz styles, telling audiences, "they tried to fool you, now I got to to school you about jazz. Louis Armstrong, now that's jazz. Billie Holiday, now that's jazz."[7] The Arkestra's embrace of jazz standards was not simply nostalgia, but rather a continuation of a musical tradition that mesmerized Sun Ra as a youth in the Deep South. He was an early adopter of the Moog synthesizer and other electronic keyboards, which added otherworldly timbres to the ensemble sound.[8] Ra and his collaborators experimented with reverb, tape delay, and other effects to create recordings that often sounded unlike any jazz that had come before. The magic of swing-era bands, like those led by Henderson and Duke Ellington, came from the collective energy of tight ensemble playing, carefully-rehearsed arrangements, and moments of brilliant solo improvisation. Through demanding rehearsals, the Arkestra developed the technique of *collective improvisation*, in which dozens of musicians simultaneously create arrangements on the fly with Sun Ra at the helm. This effect recalls the wall-of-sound majesty of earlier big band arrangements while embracing the iconoclasm and free-spiritedness of 1950s and 60s free jazz.[9]

The Arkestra's song titles, album artwork, costumes, and lyrics were a befuddling mix of space travel, ancient African themes, and Sun Ra's distinct philosophy. They took the stage in flowing, colorful robes that were simultaneously druid-like and alien and performed

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[7] John F. Szwed, *Space Is the Place: The Lives and Times of Sun Ra*, 1st ed (New York: Pantheon Books, 1997), 337.

[8] Trevor J. Pinch and Frank Trocco, *Analog Days: The Invention and Impact of the Moog Synthesizer* (Cambridge, MA: Harvard University Press, 2002), 72.

[9] Daniel Kreiss, "Appropriating the Master's Tools: Sun Ra, the Black Panthers, and Black Consciousness, 1952-1973," *Black Music Research Journal* 28, no. 1 (Spring 2008): 65.

choreographed dance moves inspired by Egyptian wall drawings. Ra himself sported sequined headdresses (often with battery-powered colored lights) that evoked ancient pharaohs. The lyrics of the jaunty Arkestra standard "Rocket No. 9" describe travel to distant planets with the same excitement as "Take the A Train" while some instrumentals like the melancholy "Tapestry from an Asteroid" sound like the inner monologue of a lonely astronaut. Arkestra recordings were published by El Saturn Records, a DIY initiative that Sun Ra founded with Alton Abraham alongside the Arkestra. The albums featured psychedelic artwork, Daliesque instruments contorting against starry backdrops, silhouettes sporting afros on alien landscapes, and abstract figures dancing atop piano keys. Sun Ra's liner notes, like those for the album 1972 album *Discipline 27-II*, offered cryptic koans that provide little clarity but situate the Arkestra's music in a broader philosophical context: "The strange truth of Eternal myth / Is the Sound, It is the / Sound truth…Music Sound."[10]

By associating jazz with Ancient Egypt, Sun Ra situated African American culture in the lineage of a technologically advanced civilization.[11] The Arkestra was a vehicle for changing consciousness by bringing Black Americans into awareness of this heritage. This was a means of reclaiming technological agency lost through centuries of enslavement and disenfranchisement, which in turn allowed Sun Ra to appropriate and reinvent the technoscientific mythology of the Space Age.[12] Space was the place for Ra to imagine a brighter Black future beyond the ghettoes and segregation of 1950s America, but before that vision could become a reality, he had to change hearts and minds through his music. Sun Ra believed that just as an instrument could be tuned, Black consciousness could be recalibrated to come into harmony with the utopian promises of space travel.[13] Through

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[10] Szwed, *Space Is the Place*, 314.

[11] Kreiss, "Appropriating the Master's Tools," 61.

[12] Ibid.

[13] Szwed, *Space is the Place*, 345.

collective improvisation, the Arkestra channeled intersubjective patterns of energy and tuned into mental frequencies that would radiate outward and bring about a change in collective consciousness.[14]

The 1974 film and accompanying album *Space is the Place* remains Sun Ra's best-known work and encapsulates his belief in the liberating power of sound and science by presenting the bandleader as an alien Other. In the film, Sun Ra arrives in Oakland, California on a spaceship powered by the Arkestra's music. He sets up an Outer Space Employment Agency to recruit young African Americans to come settle a distant space colony. The young people he meets are skeptical, believing that the Black Power movement offers them a better chance at freedom than outer space. Ra is beset from all sides by white NASA scientists, the Black Panthers, and a pimp called the Overseer. Despite these obstacles, the Arkestra performs a concert that teleports the audience to his spaceship, leaving Earth behind in its wake.[15]

Afrofuturism and the Arkestra

Sun Ra has been hailed as a progenitor of *afrofuturism* for the Arkestra's forward-thinking utopianism, blend of ancient and scientific themes, and embrace of both real and imagined technology. This descriptor was applied retroactively. The term "afro-futurism" first appeared in a 1994 series of interviews by Mark Dery with science fiction writers Tricia Rose, Samuel Delaney, and Greg Tate. "Black to the Future" is focused primarily on science fiction literature and Dery argues that the genre is ideal for exploring issues of Blackness and imagining Black futures since African Americans are a displaced people and themes of alien contact and strange new worlds mirror aspects of the Black experience in the United States.[16]

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[14] Kreiss, "Appropriating the Master's Tools," 64.

[15] Nabeel Zuberi, "The Transmolecularisation of [Black] Folk: Space Is the Place, Sun Ra, and Afrofuturism," in *Off the Planet: Music, Sound and Science Fiction Cinema*, ed. Philip Hayward (Bloomington, IN: Indiana University Press, 2004), 77–95.

[16] Mark Dery, "Black to the Future: Interviews with Samuel R. Delany, Greg Tate, and Tricia Rose," in *Flame Wars: The Discourse of Cyberculture* (Durham & London: Duke University Press, 1994), 179–180.

Despite their literary focus, Rose, Delaney, and Tate all point to Sun Ra as the forebear of Black science fiction and he personifies the science-fiction trope of the stranger in a strange land.[17] In his mid-twenties, Ra experienced an intense, messianic dream where he saw the planet Saturn, which he interpreted as his true home. He wasn't *born* on Earth, but rather arrived here on a spaceship powered by music.[18] He fully embraced the outsider-Other status that came from being an extraterrestrial and use the Arkestra to communicate his understanding of the cosmos.

But space travel and futuristic themes are only part of Sun Ra's proto-afrofuturism. Because, as Delaney writes, Black people were "systematically forbidden any images of our past," Black speculative fiction necessarily involves speculating on both the past and the future simultaneously.[19] As Rose states, "If you're going to imagine the future, you have to imagine where you've come from." Yesterday and tomorrow are intertwined and equally ripe for reimagination and reinterpretation.[20] The Arkestra's synthesis of outer space and Ancient Egyptian themes, and big band swing and free jazz was Sun Ra's way of rewriting Black history with an eye towards the future. With the Arkestra, Ra imagined that the the golden age of big bands never ended, but rather evolved to embrace the experimentalism of bebop and free jazz. He reached further back in time, tracing a historical through-line from Ancient Egypt to the South Side of Chicago. If the African Pharaohs could build pyramids and align them with the stars, impoverished Black families in postwar America also also capable of such cosmic consciousness.

Kodwo Eshun's *More Brilliant than the Sun: Adventures in Sonic Fiction* articulated a theory of musical afrofuturism. This experimental 1998 book uses Sun Ra's neologism "Myth Science" to analyze the intersection of technology, Blackness, and music in the work of diverse

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[17] Ibid., 215.

[18] Szwed, *Space Is the Place*, 29-30.

[19] Ibid., 190-191.

[20] Ibid., 215.

artists like Miles Davis, Grandmaster Flash, Funkadelic, Kool Keith, and Alice Coltrane. Sun Ra's conception of science grew out of his encounters with the Nation of Islam and represented a pre-modern practice in which alchemy, philosophy, magic, and myth were intertwined.[21] He referred to members of his Arkestra as "tone scientists" and encouraged them to manipulate human consciousness in the same way they manipulated sounds from their instruments. By paradoxically equating myth and science in his musical depictions of space travel, Ra acknowledges that concrete material technologies (*artefacts*) and the cultural understanding and beliefs about these technologies (*facts*) are intertwined.[22] Re-tuning the mythic consciousness about future technology through music could bring about material changes in the physical world. By coopting postwar images of space travel (which systematically excluded African Americans) in his music, Ra sought to reconceptualize the promise of technology into something that served the interests of African Americans.[23]

For Eshun, Myth Science encapsulates the ways in which Black musicians have adopted fluid, future-oriented stage personas, embraced new technologies, and subverted Western musical conventions. Afrofuturist music rejects conventional rationalism, linear narratives of progress, and "opposes common sense with the force and power of falsity."[24] Sun Ra was fully aware of how absurd many of his ideas seemed to the general public. At the height of the Arkestra's popularity, he relished any opportunity to shock and befuddle interviewers with claims like "The Egypt that is there now is not the real Egypt" or that humans are "like

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[21] Szwed, *Space Is the Place*, 132.

[22] Trevor J. Pinch and Wiebe E. Bijker, "The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," *Social Studies of Science* 14, no. 3 (1984): 399–441.

[23] Rayvon Fouché, "Say It Loud, I'm Black and I'm Proud: African Americans, American Artifactual Culture, and Black Vernacular Technological Creativity," *American Quarterly* 58, no. 3 (2006): 642.

[24] Kodwo Eshun, *More Brilliant than the Sun: Adventures in Sonic Fiction* (London: Quartet Books, 1998), 3.

instruments because they got a heart that beats."[25] Most of all, Myth Science complicates the false binary between written and oral tradition that is common in discussions of jazz and Black music.[26] Ra, like his predecessors Fletcher Henderson and Earl Hines, was an exacting and demanding composer and arranger. The Arkestra's collective improvisation was not an exercise in spontaneous composition nor a demonstration of individual virtuosity. Through rigorous rehearsals Sun Ra and his ensemble of tone scientists worked to tune into precise psychic frequencies and would use any technologies at their disposal (staff notation, synthesizers, homemade instruments, etc.) to do so.[27]

These inherent paradoxes of Myth Science are what give afrofuturist music its cultural power as a critique of technological progress. By equating myth and science, magic and technology, past and future, Sun Ra (and the later afrofuturists he inspired) rejected essentialisms about music and race. Myth Science erases the distinction between "Black magic" and "white science," rationalism and spontaneity, by drawing attention to the constructedness of these assumptions.[28] In the seminal 2002 essay "Future Texts," Alondra Nelson articulates how dominant narratives of race and scientific progress hinge upon the notion that Blackness is a problem to be solved. A utopian view of technology promises a "placeless, raceless, and bodiless near future" whereas a pessimistic view warns that Black people (due to their assumed primitive nature) will be left behind due to their lack of technological progress.[29] For Nelson, these contrasting dominant mythologies are two sides of the same coin that hinge upon the constructed assumptions that place, race, and history are essentially incompatible with science, technology, and progress. Blackness, cast as an irrational, primitive Other, becomes a problem

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[25] Szwed, *Space Is the Place*, 345, 246.

[26] Eshun, *More Brilliant than the Sun*, 155.

[27] Kreiss, "Appropriating the Master's Tools," 65.

[28] Rollefson, "Robot Voodoo Power," 85.

[29] Alondra Nelson, "Future Texts," *Social Text* 20, no. 2 (Summer 2002): 1.

to be solved by technology. Afrofuturist historians have worked to demonstrate the artifactual falsity of this racial-technological essentialism by uncovering a long history of African American inventions and engagement with technology.[30] Composer George Lewis points out that this dilemma was articulated by Black scholars long before the digital era that gave rise to afrofuturism, citing writers like Aimé Césire who extolled a perceived lack of technology among Afro-Caribbeans as a source of purity and pride.[31]

Afrofuturist artists imagine a future that does not require the erasure of Blackness and Black history in order to participate in technological progress. Instead, they work to synthesize Black identity with the utopian promises of technology. This directly confronts central questions raised by DuBois' *double consciousness* and Fanon's "black skin, white masks," by reconceptualizing technological-historical development through an afrocentric lens.[32]

Sun Ra and his Arkestra influenced numerous musicians, including Parliament-Funkadelic, Kool Keith, Janelle Monaé, and Tricky. The Arkestra became a model for a new mode of artistic expression through their afrocentric synthesis of music, technology, and history. The Arkestra was the product of the unique experimental atmosphere of 1950s Black Chicago, and this period in Sun Ra's life has been well documented. However, it is a sense of morality and utopianism from Sun Ra's early life in Birmingham, Alabama that set him apart from other Black artists, activists, and intellectuals in the Windy City. These values reflect the lingering influence of late nineteenth-century racial uplift initiatives championed by Booker T. Washington, who cast a long shadow over Black Alabama in the early twentieth century. In particular, Washington's message of personal autonomy, emphasis on education, and embrace

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[30] Bruce Sinclair, *Technology and the African-American Experience: Needs and Opportunities for Study* (Cambridge, Mass.; London: MIT, 2006); Carroll W. Pursell, ed., *A Hammer in Their Hands: A Documentary History of Technology and the African-American Experience* (Cambridge, Mass: MIT Press, 2005).

[31] George E. Lewis, "Foreword: After Afrofuturism," *Journal of the Society for American Music* 2, no. 2 (May 2008): 140.

[32] Nelson, "Future Texts," 3-4.

of modernization are hallmarks of Sun Ra's music and philosophy that, when combined with the radicalism of the early Black Power and Black Arts movements made the Arkestra a unique and influential musical experiment. A fuller picture of afrofuturism emerges by tracing the legacy of racial uplift through Sun Ra and the ways in which he synthesized disparate threads of Black thought to create a novel synthesis of history, technology, myth, and science.

BIRMINGHAM

The Magic City

Sun Ra was born Herman Poole Blount in 1914 in Birmingham, Alabama. He was named after Black Herman, a popular stage magician, and was raised by his mother, great aunt, and grandmother in a house across the street from Birmingham's Terminal Station where a large illuminated sign on the train station welcomed travelers to "The Magic City." Birmingham's magic was underground. Situated atop iron, coal, and lime deposits, the city experienced massive growth in the early twentieth century as rural Southerners flocked to its steel mills and foundries. By 1930, it had the largest Black population in the United States, as well as its largest Ku Klux Klan chapter. Black residents, like Herman and his family, lived in micro-segregated pockets throughout Birmingham. Jim Crow laws and the constant threat of lynchings ensured that the city remained firmly under the control of its narrow white majority.[33]

Though he died only a year after Herman's birth, Booker T. Washington looms large over Sun Ra's early life in Alabama. In the late nineteenth century, Washington foresaw the coming shift from agriculture to industry in the South and saw this transformation as an opportunity for African American advancement. Born into slavery, Washington preached a message of racial uplift and viewed industry, modernization, and education as means for disenfranchised Black

[33] William Sites, *Sun Ra's Chicago: Afrofuturism and the City*, Historical Studies of Urban America (Chicago: University of Chicago Press, 2020): 16-17.

Southerners to "prosper in proportion" as the South transformed economically.[34] He formed a network of supportive Black religious leaders, entrepreneurs, educators, and philanthropists who supported his vision. In 1881, Washington assumed leadership of the Tuskegee Institute in Alabama, which served as a base of operations for his racial and economic uplift program and which became a model for Black education in the South. Industrial education was central to Tuskegee's mission, and students received vocational training alongside a liberal arts curriculum with the goal of finding employment in the rapidly-modernizing South.[35]

Washington and and his closest allies took an accommodationist approach to white supremacy, choosing to work within the restrictions of Jim Crow rather than fight against it. This arrangement was amenable to white industrialists and helped maintain a precarious racial peace in early twentieth-century Birmingham. Factory owners had a large, industrious workforce that was encouraged to "dignify and glorify common labor"[36] and whose unionizing efforts were discouraged by a message of personal autonomy and self-reliance. Washington's accommodation to white supremacy resulted in a rift with his onetime ally W. E. B. DuBois and a split with the National Association for the Advancement of Colored People, who also accused him of exacerbating economic disparity through his association with elite business leaders. By the postwar Civil Rights Era, his message of racial and economic uplift had given way to a demand for equal rights and Washington was viewed unfavorably for perpetuating racial disparities. However, he did much to transform southern society in the late nineteenth and early twentieth centuries and exerted considerable influence on the Birmingham of Sun Ra's youth.

The extreme segregation of Jim Crow Alabama, along with a strong network of Black entrepreneurs, allowed semi-autonomous Black public sphere to flourish. While not as large

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34 Booker T. Washington, "Atlanta Compromise (Speech at the International Exposition in Atlanta, 1895)," *History Matters*, 1895, https://historymatters.gmu.edu/d/39/.

35 Booker T. Washington, "Industrial Education for the Negro," The Annals of the American Academy of Political and Social Science 49 (1913): 219–32.

36 Washington, "Atlanta Compromise Speech."

and centralized as Harlem's "city within a city" or Chicago's Black Metropolis, African American businessmen operated banks, restaurants, newspapers, and theaters that served Birmingham's large Black working class population. Many of the Black-owned businesses and cultural spaces in Birmingham were situated along Fourth Avenue North. Sun Ra's first-known composition is a 1929 piece called "Chocolate Avenue" that reflects the pride that Black residents felt toward this bustling commercial district.[37]

Social Societies and Alternative Histories

In addition to shops, restaurants, and newspapers, the Washingtonian elite furnished Black Birmingham with numerous churches, social clubs, and dance halls that remained largely out of the reach of the white population. Young Herman Blount first experienced the power of live music at Tabernacle Baptist Church with his great aunt and in the dance halls of Birmingham's Black social societies. Organizations like the Knights of Pythias, the Order of Calanthe, and the Court of the Eastern Star were supported by Black business leaders. Each club held grand annual balls, elegant black-tie affairs that featured the best dance music in the South. Herman would sneak into the balls as a child to watch the big bands. There, he also witnessed a version of Washington's message of racial uplift made manifest: in those autonomous social spaces, steel mill workers, domestic servants, and restaurant cooks, clad in tuxedos and evening gowns, mingled alongside bankers, lawyers, and other elites.[38] The largest dance floor in Birmingham was inside the Colored Masonic Temple, the headquarters of a fraternal organization that belonged to the Prince Hall order of Freemasonry, which was was founded in 1784 as African Lodge No. 459 in Boston. Their myths and rituals evoked an ancient and exotic Far East and taught that the origins of Freemasonry were in Africa, not Europe.[39]

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[37] Sites, *Sun Ra's Chicago*, 21.

[38] Szwed, *Space is the Place*, 14.

[39] Sites, *Sun Ra's Chicago*, 18.

In 1913, Booker T. Washington began raising funds for a library to serve Black readers in Birmingham, who were barred from other public libraries. It opened in 1918 and was named in his honor. Segregation ordinances prevented public funds from being spent on the Booker T. Washington library, so all reading materials came from private donations. By 1923, the library had outgrown its original small storefront space and was relocated to the Colored Masonic Temple.[40]

Herman Blount was a voracious reader, and spent countless hours in the library, where he consumed novels, poetry, religious texts, comic books, and scientific literature. From 1923, the Booker T. Washington library also housed a special non-circulating Masonic collection. From these rare Prince Hall Masonry texts, Herman learned of ancient rituals, alternative histories of African civilization, and the purported role of Black masons in the American revolution.[41] The philanthropic efforts of Booker T. Washington and the masons not only supported commerce and middle-class values for Birmingham's African American community, they also gave young Sun Ra his first glimpses behind the curtain of white supremacy. In the ballrooms and libraries of Birmingham's social clubs, he witnessed the elevated role that jazz orchestras played in Black society functions and learned a noble lineage of Black history. Jim Crow necessitated Blacks-only clubs and libraries in Birmingham, but in these segregated spaces, supported by a Washingtonian ethos of uplift and autonomy, Herman came into an awareness of the transformative power of Black music, history, and philosophy.

Despite these utopian pockets of Black culture, the spatial restrictions imposed by Jim Crow meant that many areas of musical life in Birmingham remained off-limits. Yet technology offered Black Alabamans a vehicle for transcending even these boundaries *sonically*, even when they remained *spatially* confined to designated blocks and neighborhoods. Black Southern households in the 1930s owned radios and phonographs in disproportionately large numbers, and Herman was mesmerized from an early age by the music he heard on his great-aunt's

[40] Sites, *Sun Ra's Chicago*, 18

[41] Ibid., 19; Szwed, *Space is the Place*, 21

records. Bandleader and composer Fletcher Henderson (1897-1952) was a particular favorite, capable of evoking exotic, utopian locales through the medium of big band swing. And though he was never permitted to enter the regal Alabama Theater just a few blocks from his house, he could tune into local radio station WAPI to hear performances there.[42]

Industrial Education

Herman was already a musical prodigy by the time he entered Industrial High School in 1929, capable of both playing piano by ear and—notably—reading and writing sheet music. Industrial High School was founded in 1900 by Arthur Harold Parker, an educator from Ohio whose mother was an emancipated slave. Parker moved to Birmingham in 1887 and become a renowned schoolteacher, administrator, and advocate for Black education in Alabama. He developed close ties with the Tuskegee Institute and taught summer classes there from 1915 onward.[43]

Like Tuskegee, Industrial High advocated for physical labor alongside liberal arts education and taught skilled trades to help students find employment in the New South. For all its importance at Black society functions, music was not a part of Tuskegee-style industrial education. Washington viewed cultural activities as a distraction from the rational fields of science and mathematics that were deemed necessarily for racial and economic uplift. Nevertheless, music thrived as an extracurricular activity in Birmingham's Black schools thanks to an informal guild system of dedicated volunteer music teachers and band directors.[44]

John Whatley was a trumpet player and bandleader who came up through Birmingham schools a generation before Herman Blount. He was hired to teach printmaking at Industrial High and directed volunteer bands that rehearsed before and after school hours. Whatley was a

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[42] Sites, *Sun Ra's Chicago*, 34.

[43] Birmingham Public Library, "Dr. Arthur Harold Parker: The Life and Legacy of a Pioneering African American Educator." (Online Exhibit), http://www.bplonline.org/resources/exhibits/ParkerA.H/gallery/parker/index.html

[44] Szwed, *Space is the Place*, 17-18.

strict and successful music teacher, which earned him the nickname "Fess" ("Professor") and attracted the attention of school officials. Music was one of the few viable alternatives to agricultural or industrial work for Black students in the segregated South. Yet playing in a big band required diligence, decorum, and professionalism. Fess Whatley delivered musical training and moral guidance in equal measure during the three or four hours a day that students spent rehearsing under his demanding baton. He insisted that students learn to read sheet music and master white musical styles—ballroom dances, foxtrots, waltzes—so that they could find work at both white and Black society functions.[45]

Herman began performing professionally as a teenager and adopted the snappier stage moniker "Sonny" Blount. Whatley led two professional dance bands, the Jazz Demons and the Saxo Society Orchestra, and invited some of the most dedicated Industrial High students to perform with these groups around Alabama. He provided the young musicians with tuxedos and had a reputation for checking in students' motel rooms on tour to make sure they were not misbehaving. In addition to gigs in Whaley's ensembles, Sonny began leading his own band with several classmates. He spent his days in class, his evenings rehearsing, and his nights performing. Despite this grueling schedule, he excelled academically and had a reputation for quiet intelligence and bookishness.

Huntsville and World War II

Sonny graduated from Industrial High in 1932 and quickly settled into the role of a gigging musician. In 1935, he and his bandmates were offered scholarships to the Alabama State Agricultural and Mechanical Institute for Negroes in Huntsville. They received full tuition, room, and board in exchange for serving as the school's band and playing for official functions. Sonny studied to be a teacher and was a good student, but hated dormitory living.

[45] Ibid., 22.

Perhaps due to the distance from his deeply religious grandmother as well as the lingering influence of the esoterica he encountered at the Masonic Library, Sonny became obsessed with questions of faith, the Bible, and God. He pored over concordances, exegeses, and maps in the A&M library, looking for the "real meaning of the Bible."[46] This conviction that "real meaning" lay below the surface, beneath the words—that it was something other than the conventional knowledge passed down through history—stayed with Sonny the rest of his life. At the Institute, Sonny also experienced an intense, messianic dream in which he was taken to Saturn by extraterrestrials. His dorm-mates ridiculed him when they learned of his vision (alien abduction stories were largely unheard-of before the 1960s). He dropped out after a year and returned to Birmingham. Though Huntsville is a minor chapter in Sonny Blount's life, these anecdotes indicate that he was beginning to see his musical work in a grander spiritual and celestial context.

Back home, Sonny devoted himself completed to composing, arranging, practicing, and performing. He converted the first floor of his great aunt's house into an all-hours rehearsal studio. As the Depression eased, gigs became more plentiful and Sonny filled the ranks of his band, the Sonny Blount Orchestra, with a rotating roster of young players who had little professional experience but with whom he felt "spiritually compatible." The took after Fess Whatley and trained the student-performers in both music and extramusical matters. In this period, Sonny began the lifelong habit of pontificating from the piano bench in rehearsal, lecturing his bandmates on religion, science, history, philosophy and other topics he discovered in his reading. His ruminations often left the musicians stupefied, but they remained a rapt audience since Sonny was successful at finding regular work for the group.

When the United States entered World War II in December 1941, Sonny seemed to believe that his musical life in Birmingham would go on as usual. Yet one by one, members of his band

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[46] Szwed, *Space is the Place*, 28.

were called up for military service and he was forced to fill their ranks with high school students to fulfill his playing commitments. Finally his own draft card arrived in autumn 1942. He appealed to the local draft board for an exemption, citing his great aunt's age and poor health, a debilitating testicular hernia that had plagued him throughout his life, and religious objections to killing. He was granted conscientious objector status but was arrested after he failed to report to a civilian service camp in rural Pennsylvania. After two months in prison, he was finally sent to the service camp, but again ran afoul of authorities when he refused to work and was forced to undergo psychiatric evaluation. He, like many other Black men analyzed by white psychologists in this era, was deemed psychopathic, neurotically depressed, and sexually perverse. Sonny was sent back to Birmingham in March 1943 after being deemed unfit for military service.

Throughout this entire ordeal and even for many months after returning home, Sonny wrote lengthy letters to the National Service Board for Religious Objectors. They give insight into Sonny's frame of mind as he faced the prospect of going to war, but are also some of the earliest records of how he viewed himself and his music in a broader sociopolitical context. The thought of being forced to kill and his eventual imprisonment was psychologically damaging, and the letters became increasingly frantic as the months wore on.[47]

Sonny came back to Alabama a changed man. He was angry, and his orchestra members noted that his music and his lectures had taken on a harder edge. He continued to lead his band in Birmingham for a few more years, but the memory of his wartime experience and the constant debasement of living in Jim Crow Alabama ate at him. He read in the pages of the *Chicago Defender* of the opportunities that awaited African Americans in the North. After his great aunt Ida died in 1946, Sonny packed a suitcase and walked to Birmingham's Terminal Station. Though he would carry the lessons of Birmingham with him throughout his life and career, he boarded a train for Chicago and left the indignities of the South behind for good.

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[47] Ibid., 40-43.

CHICAGO

The Black Metropolis

Sonny lived in Chicago from 1945 to 1961. He settled in the Bronzeville neighborhood on the city's South Side, a dense and vibrant Black Metropolis at the time of his arrival. His time in Chicago can be divided into three phases. He quickly found a place in the jazz scene and had steady work in Bronzeville's nightclubs. This gave way to a darker period in which urban renewal initiatives upended the South Side's vibrant nightlife and the utopian promise of the autonomous Black Metropolis crumbled.[48] Sonny (who changed his name in 1952 to Le Sony'r Ra—Sun Ra for short) became regular fixture in Washington Park, a kind of public forum for Black intellectual debate. In the third period, he and business partner Alton Abraham started a multi-pronged DIY initiative that included the Arkestra, El Saturn Records, and Thmei Research and the earliest vestiges of proto-Afrofuturist Myth Science came into being.

Almost immediately upon his arrival in Chicago, Sonny was hired by his childhood idol Fletcher Henderson to serve as arranger and pianist for nightly engagements at Bronzeville's popular Club DeLisa. This was a dream job for the thirty-two year old pianist from Birmingham. Henderson encouraged (or at least tolerated) Sonny's more experimental tendencies and Sonny, in turn, helped deliver Henderson's signature, accessible big band sound to DeLisa audiences.[49]

His dreams of a long career were quickly dashed, however, when the older bandleader abruptly left for Los Angeles in 1947. This began a much less idyllic period for Sonny Blount. He was forced to take work in the mafia-owned strip clubs of nearby Calumet City to make ends meet. This work was humiliating enough for the celibate teetotaler Sonny, and he and his other Black bandmates were forced to play behind a heavy curtain to prevent them from seeing the

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[48] Youngquist, *A Pure Solar World*, 21.

[49] Ibid., 24.

disrobed white dancers. It was a reminder that discrimination and segregation remained a harsh reality outside the borders of the Black neighborhoods, even in the North.[50]

Meanwhile, the utopian vision of Bronzeville as an autonomous Black Metropolis was fading. The Housing Act of 1949 expanded the controversial practice of *redlining*, which made it difficult for families and business owners in "high risk" Black neighborhoods to secure loans, mortgages, and insurance. Meanwhile, Chicago families with means flocked to newly-built suburbs that used *restrictive covenants* to keep non-white families away.[51] Businesses dried up, nightclubs and theaters were shuttered, and inner-city areas like Bronzeville were regarded as slums by the turn of the decade. To address these issues, the Federal Housing Authority embarked on urban renewal initiatives. Single-family homes were torn down and high-rise apartments took their place. Crowded urban streets were replaced by highways that allowed suburbanites to avoid undesirable neighborhoods on their way in and out of the city. Collectively, these efforts were an attempt to rationalize the American city—to impose order on the haphazard inner-city growth of previous decades through the use of sensible and data-driven urban planning. And while they had the goal of solving present problems with an eye toward the future, these efforts also had the effect of erasing Bronzeville's past. Many Black residents moved further and further South or relocated to the West side of Chicago.[52]

The Space Age

The third period of Sonny's life in Chicago began amidst this urban decay. With many of the large theaters and dance halls shuttered and smaller clubs unable to support big bands, jazz musicians in Chicago started forming small combos. Sonny himself founded the Space Trio in 1952 with drummer Robert Barry and saxophonist Pat Patrick. His first compositions with

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[50] Szwed, *Space is the Place*, 59.

[51] Spigel, "Outer Space and Inner Cities," 143.

[52] Sites, *Sun Ra's Chicago*, 144-148.

Space Age titles and themes were written for this ensemble. The trio found work in South Side bars and the strip clubs of Calumet City.

The Space Race entered American consciousness in the early 1950s and while Sun Ra's proto-afrofuturist attitudes toward space travel was idiosyncratic, his fascination with outer space themes was not. In the immediate aftermath of World War II, the United States invested heavily in science and technology research. By the 1950s, the most terrifying inventions unleashed during the war—German V2 rockets and American nuclear bombs—were rebranded as "peaceful contributions of science" that would lead to "human happiness and fulfillment."[53] Atomic energy and space exploration became symbols of a new, modern America, unburdened by the hardships and technological limitations of the past. Rocketeers like Werner von Braun made grand pronouncements about space travel in the popular press, linking it directly to American values of liberty, prosperity, and religion: "It will free man from his remaining chains, the chains of gravity which still tie him to this planet. It will open for him the gates of heaven."[54]

Black publications like the *Chicago Defender*, civil rights activists, and even Duke Ellington used government scientists' promises of outer space to draw attention to the stark disparities between white suburban space and neglected urban spaces like Bronzeville.[55] The postwar satellite and arms race directly impacted the historically Black neighborhoods on the South Side of Chicago. Real estate on the Southeast edge of Bronzeville was handed over to the University of Chicago for the construction of Midway Laboratories, a weapons and aeronautics facility that did R&D work for the U.S. military. A 1956 job posting for the laboratory makes the connection between scientific progress and suburban expansion explicit: "The married [engineer] may choose to enjoy suburban life in the new village of Park Forest…or one of the

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[53] Dwight D. Eisenhower, "Radio and Television Address to the American People on Science in National Security," The American Presidency Project, November 7, 1957.

[54] Walter Sanders, "The Seer of Space: Lifetime of Rocket Work Gives Army's Von Braun Special Insight Into the Future," *LIFE*, November 18, 1957.

[55] Sites, *Sun Ra's Chicago,* 191; Spigel, "Outer Space and Inner Cities," 155-157.

many other town surrounding Chicago."[56] Urban Black Americans, it seemed, had no place in this national narrative of scientific and societal progress, and for many, modernization and technology meant the erasure of their homes, neighborhoods, and cultural spaces.

Sonny followed the Space Race and scientific advances closely, and his love for reading and learning grew in Chicago. He was often seen carrying bags full of books he found at used bookstores and musicians who rehearsed in his small apartment found themselves in a cramped library, with books and magazines stacked floor to ceiling. In Chicago, Sun Ra encountered W. E. B. DuBois and envisaged himself as one of DuBois "Talented Tenth," a Black intellectual well-versed in classic literature, history, and philosophy. He studied Hebrew and etymology to attempt to uncover the hidden meaning of Bible verses. He became convinced of the lost influence of African culture on Western civilization after reading George G. M. James' *Stolen Legacy*, which argued that the origins of classical philosophy came from Egypt and not Greece. Egyptology led him to Hermeticism, which opened the door to a host of other esoterica, including gnosticism, theosophism, Kabbalistic numerology, and freemasonry, which harkened back to his early experiences at the Colored Masonic Temple in Birmingham.[57]

Washington Park and the Birth of the Arkestra

Sun Ra styled himself as a public intellectual and spent his days in Washington Park, which by the 1950s had emerged as an informal academy of radical Black thought. Communists, Pentecostal preachers, Marcus Garveyite Black nationalists, and members of the Nation of Islam gathered to pontificate, debate, and attract followers to their various causes. These new and often radical Black thinkers were all searching for a response to the racial realities of postwar America and to the fading dream of an autonomous Black Metropolis. Sun

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[56] "The University of Chicago Chicago Midway Laboratories," *Journal of Jet Propulsion* 26, no. 5 (1956): 20.

[57] John Corbett, "Sun Ra in Chicago: Street Priest and Father of D.I.Y. Jazz," in *Pathways to Unknown Worlds: Sun Ra and Chicago's Afro-Futurist Underground 1954-68* (Chicago: WhiteWalls, University of Chicago Press, 2006), 7.

Ra never aligned easily with any of the Washington Park factions. He became known as a provocateur and used clever wordplay and knowledge gleaned from his research to question, complicate, and confuse the preachers, orators, and activists on their soapboxes.

In the early 1950s, Sun Ra befriended Alton Abraham, a radiographer from Chicago who shared Sonny's interest in history, the occult, and science and quickly. Abraham became Sun Ra's business partner. Abraham recognized that because of the economic hardships that had befallen many Black-owned businesses, venues, and record labels, they would have to form and run their own institutions to find success in a rapidly-changing world. They started a company, Ihnfinity, Inc., which had three subsidiary initiatives: Thmei Research, El Saturn Records, and the Arkestra.

Thmei Research was a publishing endeavor. Ra and Abraham printed leaflets and broadsheets and distributed them in Washington Park. In the poems and essays he wrote for Thmei, he synthesized his readings and life experience and began to articulate his Myth Science philosophy. El Saturn recorded and released all of Sun Ra and the Arkestra's music from 1957 on. Ra and Abraham purchased recording equipment (which allowed them to be more experimental with recording techniques than most studios would permit) and enlisted local artists to create imagery for record releases. El Saturn records were produced and distributed in small quantities and record sleeves were frequently hand-printed and assembled. Records would be sporadically re-released (often with different artwork) when they sold out.

Sonny began recruiting members into the Arkestra in 1954. It was a hard sell. Originally imagined as an octet, the Arkestra was to be a rehearsal-only band that lived a monastic life together, rehearsed for several hours five days a week, and never made money from shows. Instead, Sun Ra and his tone scientists would conduct sonic research, and he told potential recruits that it could be a decade or more before they were ready to present their findings to the public. These high standards and no promise of pay limited the musicians willing to enlist. Sonny wasn't just looking for musicians, he was seeking *disciples*. Yet in the strange, uncertain musical

climate of mid-1950s Chicago, he managed to find a devoted group of talented, underemployed young musicians willing to rehearse for hours with the strange elder pianist from Birmingham.[58]

The Arkestra had all of the characteristics of a religious order. Sonny, as was his custom, would lecture his musicians for hours during rehearsal. Not long after its founding, the group began wearing matching uniforms, not unlike the National of Islam and other religious groups in Washington Park. Ra had strict moral codes for his ensemble and players who succumbed to the temptations of alcohol, drugs, or women would be forced to sit in silent repentance during rehearsal.[59]

The Arkestra's status as a rehearsal-only research collective did not last long. They were simply too good to not play live. Visiting musicians frequently came by to hear the new musical experiment taking place in Bronzeville and they convinced Sun Ra to audition at Birdland,[60] a South Side jazz club located inside the Pershing Hotel. Miraculously, this strange ragtag ensemble that played outer space-themed big band music landed a regular gig there, and for the next several years acted as the house band at Birdland. There, the Arkestra developed their signature aesthetic—collective improvisation, orchestral instrumentation with copious percussion, space travel and Egyptian imagery, colorful costumes, and a healthy dose of classic swing arrangements. The Arkestra's success at Birdland meant that Sonny could offer players not only moral guidance and the chance to be consciousness-changing tone scientists, but also steady work when gigs were scarce.

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[58] Youngquist, *Pure Solar World*, 64.

[59] Szwed, *Space is the Place*, 117.

[60] Birdland was also the name of a jazz club in New York that threatened the Chicago venue with legal action over the use of this name. They complied and later changed their name to "Budland."

SYNTHESIS

The Arkestra allowed Sun Ra to fully realize his proto-afrofuturist musical-philosophical vision and he led the group until his death in 1993. While the ensemble eventually embarked on international tours and moved to New York, Philadelphia, and Berkeley during subsequent decades, the Arkestra was a product of the unique cultural climate of Black Chicago in the the 1950s. It emerged out of a community of scholars, artists, and activists who were motivated by the racial crises of postwar America.

The Space Age rocket became a powerful symbol of the utopian myth of modern scientific progress, yet progress meant different things for white and Black America. The continued debasement of segregation and Jim Crow was not new, yet the FHA's discriminatory housing and lending policies cast the disparity between postwar prosperity and the economic disenfranchisement of African Americans into sharper relief. Technological advancements rapidly transformed American life in new suburbs while historically Black urban neighborhoods were neglected. The urban renewal initiatives that were meant to address these issues by modernizing and rationalizing cities decimated Black communities by their failure to acknowledge the deep cultural roots of these neighborhoods. The dream of the semi-autonomous "city within a city" crumbled under these multiple threats.

The factions and movements that sprang up in Washington Park—including Ra and Abraham's Thmei Research—were all searching for a response to the new racism of the Space Age through philosophy, religion, revolution, or some combination thereof. In this sense, the Arkestra is an artifact of the early stages of the Black Power and Civil Rights Movements in the United States. However, what sets Sun Ra's Myth Science apart from the other movements that emerged in the 1950s is the influence of Booker T. Washington's racial uplift ideology, an optimistic embrace of science and technology, and a utopian celebration of African American cultural expression—values that were engrained in Sun Ra's early life in Birmingham, Alabama.

There are remarkable parallels between Sun Ra's initiatives and the Nation of Islam, yet a close examination of their beliefs reveals how Ra's Myth Science differs from better-known Black nationalist movements. Elijah Muhammad, who assumed leadership over the Nation of Islam in 1934, was also imprisoned as a conscientious objector during World War II before settling in Chicago, where he established the Nation of Islam headquarters only a few blocks from Ra's apartment. Muhammad's followers proselytized in Washington Park, where they were frequently challenged and questioned by Ra and his musician-disciples. The NOI started publishing their own newspaper shortly after Thmei started distributing leaflets and broadsheets. Sun Ra claimed that some of his ideas and etymological thought experiments made their way into NOI theology.[61]

Science is central to both Nation of Islam cosmology and Sun Ra's worldview, yet the meaning and purpose of science differs sharply. In writings by NOI founder Fard Muhammad, a rogue ancient Black scientist named Yakub created white people, a race of devils, to torment and enslave Black Africans. Other, benevolent Black scientists would soon return aboard a Mother Ship to destroy the white devils and reestablish a Black utopia on earth.[62] Elijah Muhammad's followers preached that generations of enslavement had kept African Americans in a state of spiritual death, ignorant to history and cosmology. They viewed Black American culture as irreparably flawed due this this spiritual malnourishment. Muhammad preached that white supremacy had corrupted our knowledge of history, and that the keys to discovering these lost truths could be found through afrocentric readings of the Torah, Quran, and the Bible.

Sun Ra shared the Nation's belief that centuries of white supremacy had caused Black Americans to become "spiritually dead." Yet for Ra, the strict ascetic practices of the Nation of Islam could never shake the spiritually dead out of their slumber. Instead, Black Americans

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[61] Ra asserted that he was the first to equate the word "negro" with "death," citing a medieval magic book by Roger Bacon that conflated the Latin words "nigro" ("black") and "necro" ("death"). Youngquist, *Pure Solar World,* 57.

[62] Youngquist, *Pure Solar World*, 239.

needed a raucous, ecstatic celebration of Black history and a fantastic depiction of possible Black futures. The Arkestra's "uniforms"—colorful robes and headdresses studded with sequins, were a direct antithesis to the Nation's austere suits and bow ties. Arkestra performances, unlike the measured condemnations of Elijah Muhammad's sermons, were wild, celebratory affairs that evoked the utopianism of the Black ballrooms that young Herman Blount had encountered in Birmingham. And unlike the NOI's ancient mythology, the transcendent energy of big band music was a much more recent memory for his neighbors on the South Side of Chicago. The Arkestra, through their evocations of Ancient Egypt, took pains to associate this golden age of jazz with a noble lineage of African culture. For Ra, jazz, like Hermeticism, kaballah, or theosophy, was a form of esoteric truth, and he used the Arkestra to open audience's eyes and minds to hidden realities.

Sun Ra also split with the Nation of Islam over views of science. While Muhammad's followers prepared for the coming of a Mother Ship that would eliminate the white race, Sun Ra (in *Space is the Place*) arrives on planet via a Mother Ship powered by music, and invites people to come aboard for a consciousness-changing journey. For Ra, science and technology (symbolized by space travel) is a path towards freedom, not just a weapon or tool of white oppression. This view seems farfetched against the backdrop of 1950s Black Chicago, where technological progress meant highways vivisecting Black communities and the razing of Black homes to make way for aeronautics labs. Yet in the Birmingham of Ra's youth, industrialization and modernization provided employment and opportunities for Black Alabamans, which in turn supported a Black cultural sphere that gave rise to music halls, theaters, and societies like the Black Masons.

Like Booker T. Washington, who saw the technological advancements of the antebellum South as an opportunity for racial uplift, Sun Ra saw possibility and promise in the scientific advances of the early Space Age, a worldview that was at odds with many of the Black radical

groups in Chicago. For the Nation of Islam, white supremacy was the product of an evil scientist. For the Black Panthers (with whom Sun Ra was briefly associated in the late 1960s), the U.S. Space Program was another form of colonialism and imperialism.[63] Even moderate Black publications like *Ebony* and the Chicago *Defender* highlighted the disparity between futuristic (and expensive) NASA facilities and neglected Black towns and neighborhoods.[64]

Ra and the Arkestra rejected this essentialist binary between Blackness and scientific progress. He did not see the world as Black or white, technological or primitive, oppressed and oppressor. Instead, the Thmei broadsheets make clear that Ra's struggle was a cosmic battle between ignorance and knowledge. "Ignorance is the cause of the negroes' plight in America," he wrote, "The negro resurrected from ignorance is the only means of salvation left for America."[65] Arkestra shows would often began with a slow processional in which the ensemble chanted, "when the world was in darkness, and darkness was ignorance, along came Ra!" This crusade against ignorance, while more messianic and apocalyptic, recall Washington's advocacy for Black education in the late nineteenth century: "There is no defense or security for any of us except in the highest intelligence and development of all."[66] "It has been necessary to make the masses of the Negroes see and realize the necessity of applying what they learned in school."[67] Ra, like Washington, directed these moral appeals for wisdom and learning towards Black Americans. Both acknowledged the hardships and disadvantages that African Americans faced, but neither expressed an essentialist black inferiority that could only be overcome by toppling white supremacy. Instead, they chose to focus their efforts on the *mind*, to use their elevated

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[63] Kreiss, "Appropriating the Master's Tools," 73.

[64] Spigel, "Outer Space and Inner Cities," 157.

[65] Youngquist, *Pure Solar World*, 56.

[66] Washington, "Atlanta Compromise Speech."

[67] Washington, "Industrial Education for the Negro," 227.

status as bandleader and orator, respectively, to educate, to conquer ignorance with knowledge, to "lift the man furthest down and thus raise the whole structure of society above him."[68]

For Washington, *knowledge* meant industrial education and vocational training. Sun Ra, on the other hand, wanted to spread a more transcendental knowledge, a *gnosis* that when discovered could upend the foundational racial binaries of Western culture. He wanted Black Americans to see themselves as descendants of the Jews of the Old Testament whom Moses led out of Egypt.[69] His reading and research had led him to believe that these Ancient Israelites were originally Black Egyptians and Ethiopians, which meant that they were part of a technologically advanced civilization that built the Pyramids and the Library of Alexandria, invented hieroglyphics and laid the foundations for Hermeticism. Like the Prince Hall Masons in Birmingham, who traced their origins to before the American Revolution, this reconceptualization of Black history upends the dualism of double consciousness. If Black history and Black pride predated the transatlantic slave trade, Jim Crow, and the United States itself, there was no reason for Black Americans to view themselves as technologically inferior through the lens of white supremacy. In the words of J. Griffith Rollefson, Sun Ra was "working toward a place and time where this polarized vision no longer made any sense."[70] Sun Ra argued that Black Americans' past was "manufactured for 'em…it's not their past and it's not their history."[71] If the past was a fiction created by chattel slavery, white supremacy, and scientific racism, then he could write his own history, a "true myth" to counteract the "false truths" that had long been accepted as fact.[72]

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[68] Ibid.

[69] Youngquist, *Pure Solar World*, 57.

[70] Rollefson, "Robot Voodoo Power," 107.

[71] Eshun, *More Brilliant than the Sun*, 155.

[72] Ra, *Immeasurable Equation*, 166.

Yet knowledge of ancient history alone could not change the present conditions for those trapped in the decaying slums of postwar Chicago. "Only wisdom of the future can save this unfortunate race called negro," reads another Thmei broadsheet penned by Ra.[73] The future in the 1950s was not some far-off dream. It had already arrived in the form of atomic energy, Soviet Sputniks, bullet trains, and planes that could break the sound barrier. Sun Ra and his Arkestra of Black tone scientists performed pieces like "Super-Sonic Jazz," "We Travel the Space Ways," "Monorails and Satellites," "Future," and "The Now Tomorrow" to show that African Americans, as descendants of a technologically advanced civilization, were equally capable of participating in the scientific advancements of the Space Age. And by weaving the history of jazz into a mythic tapestry of Black history, Ra connected the familiar utopianism of the big band era to a grand historical arc that reaches forward and backward through space and time.

This intermingling of past, present, and future is a hallmark of afrofuturism. Yet Ra also continued a tradition of earlier Black intellectuals who framed their struggle for a more just future as part of a broader historical narrative. Frederick Douglass appealed to the Bible to highlight the hypocrisy of slavery.[74] Du Bois championed Pan-Africanism and positioned the plight of African Americans within a centuries-long struggle against Western colonialism.[75] And Washington, writing in 1900, expressed his racial uplift project as "the foundation laying for a people of its past, present, and future at one and the same time."[76] Sun Ra rekindled and reimagined these transhistorical lines of thought for the Space Age, and in doing so became a model for later afrofuturist artists, activists, and scholars.

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[73] Youngquist, *Pure Solar World*, 60.

[74] Frederick Douglass, "What to the Slave is the Fourth of July?" 1852.

[75] W. E. B. Du Bois, "To the Nations of the World," First Pan African Congress, London 1900.

[76] Booker T. Washington, *The Future of the American Negro* (Boston: Small, Maynard & Company, 1900), 26.

What sets Ra apart from his predecessors is that music, rather than politics, education, economics, or religion, was the vehicle that would transport people to higher planes of consciousness. "Such a reality can only become real if approached from the point of view of culture and art," reads a leaflet he distributed in Washington Park. Beauty was the antidote to the ugly urban decay that plagued Black ghettoes. Music—raw, visceral, and alive—was the anthesis to the spiritual death that Sonny saw all around in Bronzeville.

Ra ascribed cosmic significance to big band music. Throughout his early life, Black music halls were utopian oases from the cruelty and injustices of racism. Big band swing could transport Black audiences (who were otherwise limited in where they could safely travel) to faraway lands. Revues at the Club DeLisa were carefully arranged and choreographed to conjure distant, romantic locales. In his brief stint with Fletcher Henderson, Ra used gongs and pentatonic scales to evoke a mysterious and exotic Far East that Black Chicagoans could visit in mind and spirit, if not in body.[77] Rail travel, which symbolized freedom, escape, and northwards migration is a recurring theme in big band standards. In the ballrooms of Birmingham's Black social clubs, jazz was the soundtrack to a vision of Black dignity and pride made possible by a network of Black businessmen and other elites. Music, broadcast on the radio or inscribed on vinyl records could pass freely through space and time even when Black listeners remained spatially constrained by Jim Crow laws.

Music could even pierce the totalizing veil of white supremacy. Fess Whatley, the band teacher at Industrial High School, instilled in his students a strong sense of professionalism, knowing that the most decorous students like Sonny could find work at playing at white venues When young Sonny Blount set out and began leading his own jazz orchestra, he held his bandmates to the same exacting standards.

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[77] Sites, *Sun Ra's Chicago*, 65.

When Ra was imprisoned for his refusal to fight in World War II, he faced the prospect of a life without music. He wrote to the National Service Board of Religious Objectors, "My orchestra and the management of it, the arranging and composing, the rehearsing…that is the only earthly pleasure I have. To separate me from my music would be more cruel than standing me by a wall and shooting me."[78] Sonny's musical practice, however, was more than just a vocation or source of pleasure. It was a project of moral uplift, a means of righting wrongs and making manifest a more righteous future. "At my band rehearsals I talk to the fellows and try to make them see the point of knowing and admitting to oneself whether he is right or wrong and how fine it is to know the ecstasy of being right," he wrote after returning to Birmingham.[79]

Like Fess Whatley, Sonny the bandleader had taken on the mantle of serving as a moral shepherd in his small sphere of influence. Discipline and decorum were responsible for Sonny's modest success as much as his talent, and by imparting these lessons to his bandmates he could help them achieve a measure of autonomy in an unjust South that would otherwise keep them repressed. As the Arkestra rose to international prominence from their modest beginnings in Bronzeville, Ra continued to be guided by this strong sense of right and wrong, yet he found himself with a more prominent platform to spread his consciousness-changing message. Like many extraterrestrial messengers from science fiction, Sun Ra came with a simultaneous message of hope and caution. The technoutopian promises of the Space Age were accessible to disenfranchised African Americans. But to realize their potential, they would have to turn away from the deeply-engrained "false truths" passed down through history. By tuning into precise psychic frequencies with his Arkestra of tone scientists, Sun Ra demonstrated the ecstasy of being right, of rejecting false binaries and coming into a deeper cosmic consciousness.

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[78] Szwed, *Space is the Place,* 42.

[79] Ibid., 47

Music Technology and the State: The development of electronic music in Chile

INTRODUCTION

In the early 1950s, a handful of young Chilean composers began creating music with electronic sounds. Inspired by reports of electronic music in France, they gathered after hours at radio stations and in the basements of Santiago universities where they recorded strange noises, created sound collages from snippets of tape, and built makeshift synthesizers. Over the next two decades, these early pioneers achieved international acclaim for their electroacoustic compositions. They built studios across South America, established a university degree program, and made groundbreaking advances in computer music.

The development of electronic music in Chile coincided with a tumultuous period in Chilean politics amidst the global backdrop of the Cold War. Electronic composers, who worked in state-supported universities, were insulated from much of the political turmoil of the 1960s. But the violent overthrow of President Salvador Allende in 1973 ushered in an era of military rule that made Chile inhospitable to musical research and experimentation. Many fled the country and those who remained found themselves cut off from the support that had sustained their research and experimentation in the preceding decades.

The modern era of Chilean politics began with the adoption of a new constitution in 1925. From 1891 to 1925, the president of Chile was a mostly ceremonial role and the country was governed by an upper-class parliament that enforced laissez-faire economic policies that benefitted elite landowners.[1] Amidst economic hardship caused by the Great Depression and with the support of emerging middle and working classes, reformist president Arturo Alessandri Palma

[1] Jedrek Mularski, *Music, Politics, and Nationalism in Latin America: Chile during the Cold War Era*, Cambria Studies in Latin American Literatures and Cultures Series (Amherst, New York: Cambria Press, 2014), 3.

put forth a new constitution in 1925 that granted more power to the president and the state, weakened the parliamentary elites, and helped to democratize Chilean politics.[2] From the 1930s through the early 1950s, Radical Party presidents increased taxes and created a Central Bank, taking an active role in the country's copper, nitrate, and oil industries to create jobs and attract foreign investment. The middle class grew during this period and Chile experienced massive urbanization and industrialization.[3] Industrial growth brought new technologies. IBM tabulating machines were used by the Chilean government as early as 1921 and by the 1950s IBM machines were commonplace in military, industrial, and state-owned enterprises.[4]

The 1950s and 60s saw increased political polarization and the emergence of new political parties as Chile oscillated between conservative and left-wing governments. Increased foreign involvement from the United States and Soviet Union raised questions of national identity, or *chilenidad* (Chileanness).[5] Despite the increasingly tense political atmosphere of this era, Chilean universities and industries continued adopting new technologies. The country's first digital computer, an IBM 1401, was purchased for the Valparaíso Customs Agency in 1961.[6] A German Standard Elektrik ER-56 computer was installed at the school of engineering at the University of Chile in 1962, followed shortly thereafter by IBM computers at the Catholic University and University of Concepcion.[7]

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[2] John L. Rector, *The History of Chile* (New York: Palgrave Macmillan, 2003), 133.

[3] Ibid., 138.

[4] Eden Medina, *Cybernetic Revolutionaries: Technology and Politics in Allende's Chile* (Cambridge, Mass: MIT Press, 2011), 103-4.

[5] Mularski, *Music, Politics, and Nationalism in Latin America*, 11-16.

[6] Alejandro Albornoz, "Computer Music in Chile: The Beginning and Some Paths to Nowadays, An Historical Review," in *The Art of Electroacoustic Music, Proceedings of the Electroacoustic Music Studies Network* (Electroacoustic Music Studies Network, Sheffield, U.K., 2015): 3.

[7] Juan Alvarez and Claudio Gutierrez, "History of Computing in Chile, 1961-1982: Early Years, Consolidation, and Expansion," *IEEE Annals of the History of Computing* 34, no. 3 (July 2012): 24.

Following a close election in 1970 that saw a dramatic uptick in Soviet and American involvement, Salvador Allende became the world's first democratically elected socialist president. Allende increased state support for universities and cultural institutions and nationalized broad swaths of the Chilean economy. Allende's government used a groundbreaking centralized computer system, called Project Cybersyn, to monitor production and logistics in industries throughout the country.[8] His policies radically transformed Chilean culture and economics, but his efforts were stymied by heated domestic and foreign opposition. In 1973, Allende was unseated in a bloody coup led by General Augusto Pinochet. The Pinochet regime swiftly reversed progressive policies of the previous eras in favor of an extreme version of laissez-faire neoliberalism and violently purged the country of suspected leftist opposition. Education was privatized and thousands of Chileans fled the country. Military rule ended in 1990, but the political turmoil of the late twentieth century and long period of dictatorship left an indelible mark on Chilean culture and society.

Examining the cultural and political context of twentieth century Chile through the history of electronic music reveals how both music and technology are shaped by sociocultural forces. The earliest Chilean electronic composers had access to technological resources and teaching positions at government-funded universities. Cultural institutions provided a platform for their work and helped attract international scholars and artists. This support network disappeared under Pinochet and decades of progress and experimentation ended. The work of these early pioneers was largely forgotten after the end of military rule. Contemporary Chilean musicians and researchers have worked to document this lost history and evaluate the effects of political and economic policy on electronic music practice in their country.

[8] Medina, *Cybernetic Revolutionaries*, 5.

NACIMIENTO: THE BIRTH OF CHILEAN ELECTRONIC MUSIC

1950s

Electronic music in Chile emerged in the 1950s among a handful of pioneering academic composers and engineers. This was a fruitful period for Chilean art music, due to the significant overlap between musical and academic institutions that by the 1950s were well established and received official state support. The Conservatorio Nacional de Música was founded as a private institution in 1849. Through the efforts of the Bach Society, a chamber music organization in Santiago, the conservatory became a part of the newly-created Faculty of Fine Arts at the University of Chile in 1929. 1940 legislation established the Instituto de Extensión Musical, which led to the formation of a national symphony and ballet, music festivals featuring works by Chilean composers, composition prizes, and the academic journal *Revista Musical Chilena*, all under the auspices of the University of Chile.[9] The Catholic University (Pontificia Universidad Católica de Chile), founded in 1888, was also federally subsidized. While both institutions were autonomously governed prior to 1973, political historian Caterina Preda describes the two universities collectively as a kind of Ministry of Culture due to the generous federal support they received and their significant involvement in artistic affairs.[10]

Some composition teachers at the National Conservatory, including Carlos Isamitt and Frè Focke, had close ties to Europe and trained students in international postwar techniques like serialism and indeterminacy, while others, like Jorge Urritia Blondel, maintained a neoclassical, nationalist style. In the late 40s, composers Leni Alexander, Eduardo Maturana, Gustavo Becerra, and Juan Amenábar graduated from the conservatory. Maturana and Becerra would go on to join the composition faculty and taught León Schidlowsky, Francisco García, Samuel Claro, and José Vicente Asuar in the 1950s. These composers who passed through the

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[9] Juan Orrego-Salas, "Chile: Art Music," in *Oxford Music Online* (Oxford University Press, 2001).

[10] Caterina Preda, *Art and Politics under Modern Dictatorships: A Comparison of Chile and Romania* (New York: Palgrave Macmillan, 2017), 96.

Conservatory in the late 1940s and early 1950s were all involved to varying degrees in the first decades of electronic music in Chile.[11]

Juan Amenábar and José Vicente Asuar deserve special mention since they were both trained engineers as well as composers. Their knowledge of both music and electronics facilitated the rapid development of electronic music in the 1950s. Amenábar's father was a member of the prominent Bach Society and he received musical training at a young age, yet he first obtained a degree in civic engineering from the University of Chile before studying composition with Blondel in the early '50s. Amenábar worked for the Santiago electric company and at Radio Chilena until his eventual appointment as a professor at the University of Chile in 1975.[12] The younger Asuar met Amenábar in Blondel's composition classes. He studied civic engineering at the Catholic University, yet by the time he graduated in 1959 his expertise in electronic music was already attracting international attention.[13] Asuar would go on to become the preeminent Chilean electronic composer and make groundbreaking achievements in synthesis, computer music, and computer-assisted composition. These two figures loom large over the history of electronic music in Chile for both their musical work and the leadership positions they assumed in the universities.

The initial catalyst for electronic music in Chile came from France. Fernando García and Leni Alexander both received grants from the French government to continue their composition studies in Paris in 1953 and 1954, respectively. While there, they heard for the first time *musique concréte* by French pioneers Pierre Schaeffer, Pierre Henry, and Pierre Boulez, as well as electronic works by John Cage and Herbert Eimer. Upon their return to Chile, they

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[11] Federico Schumacher, *La Música Electroacústica en Chile: 50 Años* (Santiago de Chile: Confederación Internacional de Música Electroacústica, Comunidad Electroacústica de Chile, 2005), 11-12.

[12] Ibid., 21.

[13] Ibid., 29.

recounted these experiences to their colleagues.[14] Intrigued by the prospects of making music with tape, José Vicente Asuar immediately wrote to Pierre Boulez, who in 1954 came to Chile to meet with the young composers. He brought recordings and told them of the experiments taking place in France. Asuar later admitted that he did not at the time understand the technical details of Boulez' music but was excited by the possibilities of this new medium.[15] This visit was the first of many transnational dialogues and the spark that inspired the group of composers to begin experimenting with tape music in their own country.

Nacimiento

The first piece of Chilean electronic music is titled—fittingly—*Nacimiento* (*Birth*). León Schidlowsky created the work for the Santiago mime company Novisander[16] in 1956 with the help of Fernando García. Inspired by musique concréte but lacking a proper studio or equipment, the two made sounds using kitchen utensils and other objects found in García's house, including a particularly resonant bedpan that modulated his voice when García screamed into it. Using only a dictaphone (a low-fidelity tape recorder designed for voice memos) and a tape deck borrowed from the mime troupe, they recorded improvisations with their found instruments to create a collage with a distinct three-part structure. *Nacimiento* is brief (just over two minutes long), characterized by abrupt tape edits, and was created as incidental music for a play, but it represents the Chile's first foray into electronic music, the birth of a new musical practice in the country.[17]

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[14] Ibid., 13.

[15] José Vicente Asuar, "En el Umbral de Una Nueva Era Músical," *Revista Musical Chilena* 64 (1959): 11–32.

[16] Novisander, previously called Teatro Mimico, was founded by Alejandro Jodorowsky, who went on to create the surrealist cult films *El Topo* and *The Holy Mountain*.

[17] Schumacher, *La Música Electroacústica en Chile*, 16-17.

Radio Chilena and *Los Peces*

It is perhaps because of its technological crudeness that *Nacimiento* has been overshadowed by Juan Amenábar's 1957 piece *Los Peces* (*The Fishes*) as the progenitor of Chilean tape music. In 1953 Amenábar was working as a classical music programmer at Radio Chilena, a private station run by the Archdiocese of Santiago. This position gave Amenábar and his follow composers access to much-needed audio equipment. When the station went off the air at one in the morning, they experimented with recording techniques and tape manipulation until the break of dawn, capturing and classifying sounds created from objects and instruments at the studio.[18]

Los Peces emerged out of these early-morning experiments. Like *Nacimiento*, it was commissioned as incidental music for a play, but unlike Schidlowsky's improvisational piece, *Los Peces* was composed as a score over several years using mathematical procedures to determine its pitches, rhythm, and form (a feature of many of Amenábar's works). The only sound source for *Los Peces* was a the radio station's piano, but Amenábar removed the attack of each note from the recording tape, thus obscuring the characteristic timbre of struck strings. Furthermore, he enlisted the help of Asuar to gradually increase the microphone level as each piano note decayed, giving the impression of an instrument with infinite sustain. *Los Peces* feels weightless and impressionistic, evoking the undersea atmosphere implied by its title, and is punctuated by striking periods of silence. While it is technically musique concréte (in the sense that it was made by spicing together recorded natural sounds), *Los Peces* shows a preoccupation with pitch and timbre, foreshadowing the use of synthesizers that would later come to dominate Chilean electronic music.[19]

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[18] Ibid., 18.

[19] Ibid., 24-26.

Taller Experimental del Sonido, Werner Meyer-Eppler

Several years of after-hours experimentation at Radio Chilena gave the young Chilean composers a glimpse of the potential of electronic music, but the lack of dedicated equipment and restricted access made it untenable as a long-term laboratory. Amenábar and Asuar, both engineers, recognized the technical limitations of the station's studio. In 1957, Asuar was still an engineering student at the Catholic University and drew upon his connections there to help establish the Taller Experimental del Sonido (Experimental Sound Workshop). While never an official university-sponsored endeavor, the Taller received space and goodwill support from the departments of acoustics, electronics, film, and cultural extension. It helped to legitimize electronic music in Chile and provided a platform for research and lectures.[20] In 1957 Gustavo Becerra (then a professor of theory and composition at the University of Chile) published an article titled "What is electronic music?" under the auspices of the Taller Experimental in the *Revista Musical Chilena*, describing the possibilities of electronic music and introducing their work to the broader public.[21]

Arguably the most momentous consequence of the Taller Experimental del Sonido was a 1958 visit by influential German physicist and acoustician Werner Meyer-Eppler. In the early 1950s, Meyer-Eppler had spearheaded the creation of an electronic music studio at Nordwestdeustscher Rundfunk in Cologne and was a mentor to Karlheinz Stockhausen at the University of Bonn.[22] During his week-long stay in Santiago, Meyer-Eppler gave classes and lectures that were covered in the national press. He became close friends with Asuar and published an essay (in Spanish) in the *Revista Musical Chilena*. "Principles of Electronic Music" laid out in detail the technical requirements for an electronic music studio on par with the

[20] Ibid., 18-20.

[21] Gustavo Becerra, "¿Qué Es La Música Electrónica?," *Revista Musical Chilena* 11, no. 56 (1957): 27–44.

[22]Richard Toop, "Stockhausen, Karlheinz," in *Oxford Music Online* (Oxford University Press, 2001).

Cologne facility.[23] Capitalizing on the positive attention of Meyer-Eppler's lectures, Asuar and Amenábar wrote to the dean of the Faculty of Arts at the University of Chile to formally propose the creation of a dedicated electronic music laboratory and argue for its artistic and scholarly significance.[24] While it would take a decade for their dream to be fully realized, Meyer-Eppler's visit was a a major step toward the institutionalization of electronic music in Chile.

Variaciones Espectrales

Asuar did not wait idly for the University of Chile lab to come to fruition. Still an engineering student when Meyer-Eppler came to Santiago, he proposed to build a studio and create a large-scale electronic work as his thesis project. Asuar borrowed oscillators from the engineering department to generate basic waveforms, designed a special device to modulate timbres, and built a mixer to combine sounds. He set up a reverberation room and obtained four tape machines from the Musical Extension Institute to capture and assemble all of these sonic elements.[25]

The resulting piece, *Variaciones Espectrales* (*Spectral Variations*) was premiered to a full hall at the Antonio Varas Theater in 1959 and was reported on extensively in both newspapers and the music press. As the name suggests, it consists of four variations built from "spectral" sounds that Asuar generated with his makeshift synthesizers. Each variation evokes a different historical style—chorale, scherzo, dance—yet the sonorities of the piece are completely futuristic. Asuar not only avoided traditional tonal materials and instrumental timbres, but also rejected the pointillistic atonality of many of his contemporaries. The spectral sounds could only be created through electronic synthesis. *Variaciones Espectrales* is remarkably accessible and clear in its organization, despite its utterly novel sonic palette. Composer and

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[23] Werner Meyer-Eppler, "Principios de La Música Electrónica," *Revista Musical Chilena* 13, no. 64 (1959): 6–10.

[24] Schumacher, *La Música Electroacústica en Chile*, 28.

[25] Asuar, "En El Umbral de Una Nueva Era Músical."

historian Federico Schumacher states that Asuar was aware of the impact the work would have in Chile and used it as an opportunity to advocate for the potential of electronic music. This concern with accessibility and a desire to demonstrate the possibilities of music technology will recur in Asuar's later work with computers.[26]

1960s

The 1960s were a transformational period in Chilean politics and economics. The economic growth of the previous decades came in the form of export industries, most of which were owned by elite landowners or foreign firms.[27] Overseas investment had increased the national debt and led to inflation. This was especially detrimental to Chile's rural poor, who felt the effects of inflation while working in farms and mines owned by wealthy elites. The rapid urbanization of the early twentieth century meant that rural concerns went largely neglected until the 1960s. This situation led to a crisis of national identity. Questions of *chilenedad* (Chileanness) became central to culture and politics of the decade. In 1964, Eduardo Frei of the newly-formed Christian Democratic Party was elected president. Amidst the simmering Cold War, Frei set out on a national reform project that sought a moderate path between capitalism and socialism.[28]

These debates played out in genres of popular folk music, with *música tipica* groups projecting a patriotic and nostalgic national identity based on romantic cowboy (*huaso*) imagery and explicitly leftist *neuva canción* musicians drawing upon Indigenous traditions from northern and southern Chile.[29] While never explicitly drawing upon these emerging popular styles, some art music composers like Gustavo Becerra incorporated Chilean themes in their

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[26] Ibid., 32-36.

[27] Mularski, *Music, Politics, and Nationalism in Latin America*, 3-4.

[28] Rector, *History of Chile*, 162-3.

[29] Mularski, *Music, Politics, and Nationalism in Latin America*, 56.

music in the 1960s, while others continued to work in the cosmopolitan postwar avant-garde styles of the era.[30]

Frei began a project of "Chileanizing" the lucrative copper industry by buying majority shares in many large mines, helping funnel profits back to working Chileans, rather than foreign companies or landowners.[31] Land reform also involved breaking up large, privately-owned agricultural estates (haciendas) and transferring plots of land directly to farmers.[32] The Christian Democratic government increased educational opportunities by initiating a national entrance exam to Chilean universities. Previously, university education was only accessible to elites across the country or the urban Santiago middle class. University attendance increased dramatically as the working class gained equal opportunities to enroll.[33]

Despite these measures, political polarization increased throughout the 1960s. Conservatives criticized Frei's reform projects while leftists argued that the measures did not go far enough. In 1967, university students across the country went on strike and successfully demanded democratic university governance and input into curriculum and course offerings.[34]

International Attention

The monumental technological achievement of *Variaciones Espectrales* attracted international attention and put Chilean electronic music on the map. Shortly after its premiere, Asuar received a scholarship from the German Academic Exchange Service to study at the Hochschule für Musik in Berlin. He remained in West Germany for three years and attended the Darmstadt Summer Courses, where he met Stockhausen, Luciano Berio, Luigi Nono, and

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[30] Gustavo Becerra-Schmidt, "En Torno al Exilio y a La Transición a Una Forma de Inmigración: Recuerdos Sueltos y Personales," *Revista Musical Chilena* 57, no. 199 (January 2003).

[31] Rector, *History of Chile*, 164.

[32] Ibid., 167-8.

[33] Ibid., 164-5.

[34] Ibid., 168-9.

György Ligeti. With Meyer-Eppler's support, he was commissioned to build a new electronic music studio in Karlsrühe, where he composed *Preludio La Noche* and *Serenada para mi voz y sonidos sinuosidales*.[35] He returned to Santiago in 1962 as a professor of acoustics at the University of Chile, yet continued to give seminars throughout Latin America and Europe. He left again in 1965, this time for Caracas, where he was hired by the Venezuelan National Institute of Culture to build an electroacoustic laboratory. While there, he worked on a large-scale multimedia project called *Imagen de Caracas* and composed *Guararia Repano*, which later won the Bourges International Competition of Electro-Acoustic Music.[36]

With Asuar frequently out of the country and few others possessing his level of technical expertise, production slowed somewhat in Chile in the early 1960s. Yet the pioneering work of the late 1950s continued to attract international visitors. In 1960 and 1964, Argentinian composer Francisco Kröpfl came to Santiago to explore the prospects of creating an electronic studio in his Buenos Aires.[37] Gustavo Becerra, León Schidlowsky, and Juan Amenábar told him of their work with the Taller Experimental del Sonido and showed him the studio Asuar constructed for *Variaciones Espectrales* at the Catholic University. Back in Argentina, Kröpfl worked with composer Alberto Ginastera to found the Centro Latinamericano de Altos Estudios Musicales (CLAEM), which would become a major hub for electronic music in South America.[38]

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[35] Ricardo Dal Farra, "Un Voyage Du Son Par Les Fils Électroacoustiques: L'art et Les Nouvelles Technologies En Amérique Latine" (Doctoral Thesis, Montréal, Université du Québec à Montréal, 2006), 206.

[36] Schumacher, *La Música Electroacústica en Chile*, 30.

[37] Alejandro Albornoz, "Music & Technology in Chile: Reflections on Its Development and Cultural Implications," in *Instalando: Arte & Cultura Digital*, ed. Ignacio Nieto, Italo Tello, and Ricardo Vega (Santiago: LOM Ediciones, 2007), 131.

[38] Luis Eduardo Herrera, "Electroacoustic Music At CLAEM: A Pioneer Studio in Latin America," *Journal of the Society for American Music* 12, no. 2 (May 2018): 179–212.

Several composers trained at the University of Chile in the early 1960s began composing with electronic sounds. Among them is Gabriel Brnčić, who was a teenager in the mid-1950s when Amenábar broadcast tape music by Stockhausen and Herbert Eimert on Radio Chilena. Hearing these transmissions inspired him to pursue electroacoustic music, and like Asuar and Amenábar he studied engineering alongside music composition. Brnčić met Francisco Kröpfl during his 1964 visit and was invited to continue his composition studies at CLAEM. He remained there until 1974, working his way from student to professor to eventual artistic director of the facility. Chilean composers Miguel Letelier, Iris Sangüesa, and Enrique Rivera also created electronic works at CLAEM during this period.[39]

Sound Technology Degree and Musical Phonology Lab

In 1968, the electroacoustic program at the University of Chile that Asuar and Amenábar proposed after Meyer-Eppler's visit a decade earlier finally became a reality. A Sound Technology degree was created within the Faculty of Musical Arts and Sciences and Asuar was charged with finding qualified teaching faculty and obtaining the necessary equipment. The purpose of this degree was to train students for careers in recording studios, radio, and film, but Asuar sought to push the curriculum in a more artistic direction. Students were required to create an electroacoustic work as part of their studies, leading to a number of new pieces and regular concerts. Asuar successfully lobbied for a Musical Phonology laboratory that would bring together musicians and technicians for research and composition and obtained synthesizers and recording gear from the United States for this purpose. For the next ten years, electronic music had a dedicated facility and institutional support in Chile's most prestigious university.[40]

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[39] Schumacher, *La Música Electroacústica en Chile*, 41-42.

[40] Ibid, 48-49.

1970 Presidential Election

The political polarization that had been steadily increasing throughout the 1960s came to a head with the presidential election of September 1970. Votes were almost evenly split between three candidates: socialist Salvador Allende of the newly-formed Unidad Popular coalition; right-wing independent Jorge Alessandri, who had the support of the National Party; and centrist Radomiro Tomic from the Christian Democratic Party. Allende won a narrow plurality of votes, followed closely by Alessandri, but since no candidate received an absolute majority of votes, the constitution of 1925 required the National Congress to decide between the two leading candidates.[41]

The United States was concerned by the rise of a socialist leader in Chile while the Soviet Union supported Allende's candidacy. Under direction of National Security Advisor (and later Secretary of State) Henry Kissinger, the CIA conducted a propaganda campaign against Allende in the lead-up to the election. When these efforts failed to prevent the Unidad Popular candidate from winning a plurality of votes, U.S. president Richard Nixon ordered the CIA to support a military coup to stop Allende from taking office. However, the commander of the Chilean armed forces, General René Schneider, was opposed to military intervention in politics so a plan was hatched to kidnap the general and remove him from the country. The CIA provided weapons and funding to a group led by retired military officer Roberto Viaux, but when the attempted kidnapping took place on October 22, 1970, Schneider was shot and died three days later.[42]

Schneider's assassination enraged Chileans across the political spectrum and revealed the extent of foreign intervention in domestic politics. Wishing to protect the integrity of the election, centrist politicians (and many conservatives) in the National Congress joined the

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[41] Rector, *History of Chile*, 169-172.

[42] Zakia Shiraz, "Review: CIA Intervention in Chile and the Fall of the Allende Government in 1973," *Journal of American Studies* 45, no. 3 (August 2011): 606.

Unidad Popular in supporting Allende and his election victory was ratified on October 26, 1970. The extent of the CIA's involvement was only revealed in 1999, when U.S. president Bill Clinton ordered the release of all classified files related to covert action in Chile.[43]

Allende sought to move Chile toward socialism through peaceful, rather than revolutionary means by working within the framework of the constitution. The first two years of his presidency were marked by rapid economic growth and wealth redistribution. He expelled many foreign companies and nationalized large swaths of the economy, leading to increased employment.[44] Most significantly for the development of electronic music, Allende championed education and increased support for all Chilean universities. Enrollment at the University of Chile doubled as new socioeconomic groups gained access to higher education.[45] Many of the most groundbreaking developments in the history of Chilean electronic music take place during this period.

Computer-Assisted Composition

With the Sound Technology degree and Musical Phonology lab in place at the University of Chile, Asuar recruited some students and fellow faculty into a Sound Technology Research Group to begin work on what would become his most significant contribution to music technology: the use of digital computers to create music.[46] Aware of the pioneering work in computer music by Max Matthews, Lejaren Hiller, Leonard Issacson, and Iannis Xenakis, Asuar set out to use the IBM System/360 at the university's computing center to compose a piece for

[43] Ibid., 604.

[44] Rector, *History of Chile*, 172-3.

[45] Ibid., 181.

[46] José Vicente Asuar, "Música Con Computadores: ¿Cómo Hacerlo?," *Revista Musical Chilena* 118 (1972): 36–66.

orchestra.[47] Unlike Hiller's 1957 *Illiac Suite*, which used an early computer at the University of Illinois to compose a baroque-style string quartet, Asuar and his team used probabilistic distributions and serialist techniques to generate thirty polyphonic pitch-rhythm sequences with the System/360 using a program written in the FORTRAN IV language. Student assistants transcribed the computer output into traditional notation and helped choose the most musically interesting sequences. Asuar then arranged three as movements for chamber orchestra, making decisions about orchestration, tempo, and dynamics. The resulting piece, *Formas I*, was premiered by the National Symphony Orchestra in December 1971. *Formas II*, which used similar computer-assisted composition methods, was created in 1972.[48]

While the names of many of the student assistants are lost to history (perhaps due to the scarcity of opportunities to continue making electronic music during the Pinochet era), the Sound Technology degree brought many new faces into the world of Chilean electronic music and helped expand interest in the growing practice. This growth was made possible by governmental support of the University of Chile, which was especially generous during the Allende years. *Formas I* and *II* are attributed to Asuar, yet these pieces were the result of collaborative efforts by the Sound Technology Research Group and required interdepartmental cooperation. In fact, Asuar was out of the country for much of 1971. He received a Fulbright grant to work with Lejaren Hiller at the University of Buffalo that year. While there, Hiller and Asuar worked on a system for controlling analog synthesizers using a digital computer and co-published a report on their methods.[49] Asuar created a piece using these techniques called *Buffalo '71* during his time in New York. Interfacing between digital and analog equipment

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[47] Martín Alejandro Fumarola, "Report of the COMDASUAR: A Significant and Unknown Chilean Contribution in the History of Computer Music," in *Proceedings of the International Computer Music Conference* (ICMC, Ann Arbor, Michigan, 1998): 1-2.

[48] Albornoz, "Computer Music in Chile," 6.

[49] José Vicente Asuar and Lejaren Hiller, "Programmed Control of Analog Sound Generators by Digital Computer," *SUNYAB*, 1973.

became a key issue in electronic music in the 1980s and led to the creation of the standard, non-proprietary MIDI (musical instrument digital interface) protocol that is still in use today.

Composers at Home and Abroad

Asuar was not alone among Chileans making electronic music in the late 1960s and early 1970s. Gustavo Becerra, then chair of composition at the University of Chile and a champion of electronic music, created works that combined electronic sounds with voices and instruments, including *Oratorio Machu Picchu* (1966), *Lord Cochrane de Chile* (1967), and *Ode to Barbed Wire* (1969), all based upon texts by poet Pablo Neruda.[50] Juan Amenábar composed several electroacoustic pieces between 1968 and 1976, including *Klesis* (1968), *Preludio en High Key* (1970), and *Ludus Vocalis* (1973), before turning to strictly instrumental composition.[51] At CLAEM in Buenos Aires, Iris Sangüesa created *Integración* (1968), a unique early multimedia piece for tape, dancer, and color projections.[52] Gabriel Brnčić was especially prolific at CLAEM, composing numerous works combining tape and small ensembles.[53] In France, Chilean composer Iván Pequeño made *Ahora* (1973), which won the Bourges Electro-Acoustic Music Prize that year. Becerra's former student Jorge Arriagada was also in France during this period working with Pierre Schaeffer's Groupe de Recherche Musicales.[54]

El Computador Virtuoso

After returning from his Fulbright residency, Asuar's next computer-music endeavor was a departure from his previous work. Perhaps inspired by the egalitarian spirit of the

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[50] Federico Schumacher, "Catálogo de Las Obras Electroacústicas de Gustavo Becerra-Schmidt," *Revista Musical Chilena* 61, no. 207 (June 2007).

[51] Schumacher, *La Música Electroacústica en Chile*, 23.

[52] Dal Farra, "Un Voyage Du Son Par Les Fils Électroacoustiques," 207.

[53] Silvia Herrera, "Gabriel Brnčić: Un Primer Acercamiento Hacia El Compositor y Maestro Chileno En El Exilio," *Revista Musical Chilena* 59, no. 204 (December 2005): 26–59.

[54] Schumacher, *La Música Electroacústica en Chile,* 52-53.

Allende era or simply wishing to expand beyond academia and bourgeois concert halls, Asuar set out to create an LP of accessible computer music for the general public. This time, he and his research group used the PDP-8 computer[55] in the university's department of physics and mathematics. They designed and built digital-to-analog converters to connect the computer to the ARP 2600 synthesizer at the Musical Phonology lab. Unlike *Formas,* which required an intermediate step to translate digital output into sound, this new system allowed the computer to produce sounds directly from the ARP.[56]

Rather than expanding upon the modernist compositional techniques of *Formas* and *Buffalo '71*, Asuar and his team created digital arrangements of classical works by Debussy, Bach, Ravel, Chopin, and Manuel de Falla. These scores were written in computer code that "performed" them automatically and included instructions for manipulating timbres, dynamics, and expressive effects. The LP *El Computador Virtuoso* was released in 1973 and sold out almost immediately. It remains one of Asuar's best-known works. The A side of the record is a kind of lecture-demonstration in which Asuar describes the principles and computer music with numerous sonic examples. The B side features the six classical arrangements.

Despite Asuar's explanatory efforts, some reviewers compared *El Computador Virtuoso* to Wendy Carlos' bestselling 1968 album *Switched-On Bach*, which featured arrangements of Bach's music played on a Moog synthesizer. Carlos, however, played the Moog directly using a keyboard, whereas in *El Computador Virtuoso*, the ARP synth was fully automated by the computer.[57] Though largely neglected by histories of computer music due to the political

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[55] In his 1973 article "Haciendo música con un computador," which describes the system used for *El Computador Virtuoso*, Asuar states that the computer used was a "PDR-8" and this has been repeated in writings by Schumacher, Albornoz, and others. I can find no evidence of a computer from this era (or any other) called PDR-8. Asuar likely intended to write "PDP-8," the name of a minicomputer produced by Digital Equipment Corporation that was commonplace in academia during this period.

[56] Schumacher, *La Música Electroacústica en Chile*, 56-57; José Vicente Asuar, "Haciendo Música Con Un Computador," *Revista Musical Chilena* 27, no. 123 (1973): 81–82.

[57] Coriún Aharonián, "La Música, La Tecnología y Nosotros Los Latinomericanos," *Lulú: Revista de Teorías y Técnicas Musicales* 3 (1992): 52–61.

turmoil that would soon engulf Chile, *El Computador Virtuoso* was a significant step toward computers becoming viable mainstream tools for music production.

DESTIERRO, ENCIERRO, ENTIERRO: MUSIC UNDER PINOCHET

By 1972, the rapid wealth redistribution and economic growth of Allende's presidency caused demand for products to outpace available supplies. A lucrative black market for goods like coffee and sugar emerged and the government rationed beef, worried that ranchers would slaughter their entire herds to keep up with demand.[58] Allende's conservative opposition at home and abroad capitalized on this scarcity in an attempt to force Allende out of office. The Confederación Democrática (CODE), an anti-Unidad Popular coalition, instigated a series of debilitating strikes that destabilized the Chilean economy. The Nixon administration provided monetary support to CODE and to strike funds, while simultaneously cutting off loans and grants to Chile.[59] Despite these efforts, the Unidad Popular retained control of the government after the March 1973 parliamentary election.

After failing to unseat Allende at the polls, CODE began openly calling for the military overthrow of the Allende administration. Seeking to avoid such a scenario, Allende added a handful of military officers to his cabinet, who he hoped could help quell the worsening conflict between left- and right-wing factions. When Defense Minister Carlos Prats resigned in August 1973, Allende appointed General Augusto Pinochet as his successor, believing that he would uphold the constitution and support the democratically-elected leadership. This decision would be Allende's undoing. On the morning of September 11, 1973 the military, under orders from Pinochet, began its swift overthrow of the Allende government. Sound technology was a part of Pinochet's strategy; the military first seized control of the country's radio stations to

[58] Rector, *History of Chile*, 173-4.

[59] Ibid., 177.

announce the inauguration of military rule before moving on to government buildings and universities.[60] As bombs and gunfire rang out around the presidential palace La Moneda, President Allende, too, broadcast his final address to the country on the leftist Radio Magellanes station before its signal was cut off by the usurpers. He died by suicide shortly thereafter. By the end of the day, Chile was under military rule, where it would remain for the next seventeen years.

Caravan of Death

State terror persisted throughout the entire military dictatorship, but was especially acute in the immediate wake of the coup. Pinochet established the Dirección de Inteligencia Nacional (National Intelligence Directorate, DINA), a secret police force charged with purging the country of Marxists and Unidad Popular supporters through extrajudicial means. Enemies of the regime would inevitably meet one of three ends: "destierro, encierro, entierro" (exile, imprisonment, or death) and citizenship was revoked for exiled individuals, rendering them stateless.[61] In September and October 1973, a "Caravan of Death" of military police and DINA operatives flew to prisons across the country to carry out executions.

Musicians were not exempt from this reign of terror. Popular *nueva canción* singer and Allende supporter Victor Jara was taken prisoner the day after the coup and brought to the National Stadium in Santiago with thousands of other Unidad Popular supporters. At this makeshift prison camp, his hands were violently broken and he was shot numerous times before his body was left in the street.[62]

While Jara's death has received greater attention in studies of music from the Pinochet era, the execution of youth orchestra conductor Jorge Peña Hen on October 16, 1973 cast a

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[60] Ibid., 182.

[61] Preda, *Art and Politics under Modern Dictatorships*, 96.

[62] Mularski, *Music, Politics, and Nationalism in Latin America*, 221.

chill over the next decade and a half, even among academic musicians who were not outspoken against the military regime. Peña transformed music education in Chile in the 1950s and 60s, especially in the northern La Serena region. He sought to make quality music education available to everyone in the country, not just the elites in Santiago. The Orquestra de Niños, founded in 1964 "left musicians, government officials and the public alike" stunned at their level of musicianship.[63] Under the direction of Peña, the Orquestra toured Latin America and became a model for other youth orchestras throughout the continent. Peña's work in rural Chile was supported by the Allende government, which led to him being associated with leftist politics, despite the fact that he only advocated publicly for accessible music education. Peña was arrested on false charges of having smuggled firearms into the country in children's instrument cases after an Orchestra de Niños trip to Cuba and was executed at a prison camp in La Serena.

Composers in Exile

Gabriel Brnčić experienced political turmoil in Argentina as well, due to the ascendancy of right-wing factions loyal to Juan and Isabel Perón, and in 1974 chose to go into self-imposed exile in Barcelona rather than return to Chile. Exile offered composers stability and freedom from fear that was lacking in under Pinochet's rule. Brnčić went on to have a prolific career in Spain and made numerous advances in computer music.[64] Despite his preeminence in Chilean music education and reputation in academic music circles, Jorge Peña's death was not mentioned in the *Revista Musical Chilena* until after the fall of the military regime.[65] Composers in Chile were

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[63] Alexandra Carlson, "Inundating the Country with Music: Jorge Peña, Democracy, and Music Education in Chile," *Journal of Historical Research in Music Education* 36, no. 1 (October 2014): 72.

[64] Alejandro Guarello, "Entrevista a Gabriel Brnčić: Compositor Chileno Radicado En Barcelona, España," *Resonancias* 13 (2003): 5–38.

[65] Agustín Cullell, "Homenaje a Jorge Peña Hen," *Revista Musical Chilena* 45, no. 176 (1991): 5–8.

publicly silent about his murder. Only Brnčić, safely abroad in Spain, memorialized the late conductor in his 1976 piece *Cueca para la exaltación de Jorge Peña Hen*.

An estimated 200,000 Chileans fled the country during the dictatorship and the majority of those who left, like the academic electronic musicians, were well educated and middle class.[66] Nearly all of the early electronic music pioneers found refuge abroad. Gustavo Becerra was appointed in 1971 by the Allende government to serve as Chile's cultural attaché to Germany. This connection to the Unidad Popular made his return to Chile dangerous after the coup, so he remained in Germany and taught composition at the University of Oldenberg for the rest of his career.[67] Becerra's students Ivan Pequeño and Jorge Arriagada were both in Paris and members of Pierre Schaeffer's Groupe de Recherche Musicales in the early 1970s. Peqeño stayed in France after the coup and assumed a teaching post at the Centre Americain. Arriagada earned a doctorate in computer music from Stanford University in California before returning to work at the French Ministry of Cultural Affairs.[68]

Fernando García had assumed prominent teaching and administrative positions in the Instituto de Extensión Musical by the late 1960s. He fled in 1973, first going to Peru before settling in Cuba in 1979.[69] Eduardo Maturana had been involved the Chilean Socialist Party and even composed a work for orchestra and electronics in honor of Che Guevara in 1968. Despite these leftist ties, he remained in Chile until 1977, when he left to play viola in the Panama Philharmonic Orchestra. He eventually moved to Toronto and stopped composing in the early 1980s.[70] In 1968, León Schidlowsky and Leni Alexander both received Guggenheim

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[66] Rector, *History of Chile*, 198.

[67] Becerra-Schmidt, "En Torno al Exilio y a La Transición a Una Forma de Inmigración."

[68] Schumacher, *La Musica Electroacústica en Chile*, 52-53.

[69] Rodrigo Torres, "García (Arancibia), Fernando," in *Oxford Music Online* (Oxford University Press, 2001).

[70] Graciela Paraskevaídis, "Eduardo Maturana, Un Músico Olvidado," *Revista Musical Chilena* 68, no. 222 (December 2014): 58–69.

fellowships to work in Germany and France, respectively. Schidlowsky would never return to Chile and instead settled in Tel Aviv, Israel, where he taught at the Rubin Academy.[71] Alexander, who was always fond of Chile and its music, did not return until the 1990s.[72]

This mass exodus of skilled composers and teachers was the most immediate effect of the coup d'état on the development of electronic music in Chile. The founding of the Sound Technology program in 1968 at the University of Chile made a place for music technology at the heart of the country's musical-academic establishment and brought together numerous pioneers who had been experimenting with electronic sounds since the 1950s. It was a springboard for Chilean musicians to launch international careers and a hub that attracted prominent visitors. For a few brief years, electronic music flourished thanks to this critical mass of talent and institutional support. By the mid 1970s, however, these experienced figures were scattered across the globe, and the collaborative support and experimentation that had sustained Chilean electronic music for two decades rapidly vanished.

Two names are conspicuously absent from the list of composers who left the country. José Vicente Asuar and Juan Amenábar, the engineer-composers responsible for many seminal episodes in the development of Chilean electronic music, remained in the country for the duration of the dictatorship, though each responded differently to life under military rule. Asuar left his faculty position at the University of Chile in 1975 and continued his work in private. It is not clear why at this point Asuar left behind this institution that he had worked so long to build. Perhaps he feared that his high profile and frequent travel would make him a target of the regime, as was the case with Jorge Peña. Maybe he foresaw the coming demise of the Sound Technology program and wished to prepare for the inevitable. Or possibly the reasons were personal; he and Juan Amenábar, close collaborators since the early 1950s, had a

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[71] Ronit Seter, "Schidlowsky, León," in *Oxford Music Online* (Oxford University Press, 2001).

[72] Raquel Bustos Valderrama, "Leni Alexander Pollack (1924-2005)," *Revista Musical Chilena* 61, no. 207 (June 2007).

falling out sometime in the 1970s and no longer spoke to each other. The reasons for this are unknown but may have stemmed from professional competition, as arts faculty positions were increasingly tenuous in this era.[73]

Amenábar took over Asuar's post upon his departure and was eventually promoted to Dean of the Faculty of Arts. While many of his colleagues were forced into silence or exile when the military seized control of the university, Amenábar remained in this position for the duration of the dictatorship. His works, unlike Maturana's or Becerra's, are almost entirely abstract and non-programmatic, based upon mathematical procedures rather than extramusical inspiration or texts. In a 1997 interview, he called revolutionary music "stupid and childish" and argued that "Some artists can be influenced by politics, but they are capable enough to render the political connotations secondary to aesthetic concerns."[74] This skepticism and absolutist art-for-arts-sake aesthetic may have helped insulate Amenábar from scrutiny by the junta. Amenábar stopped composing with electronics in 1976 and his instrumental work took on a neo-impressionist style.[75] Music technology in the mid-1970s was still large and expensive, and while he continued to support the few Sound Technology students interested in electronic music, the equipment acquired in the late 1960s gradually fell into disrepair. In contrast to 1958, when he Asuar persuasively argued for an electronic music lab, Amenábar did not appeal to the military rectors for new synthesizers and tape machines two decades later.

Culture and Economics under Pinochet

Studying Chilean music under Pinochet is complicated by the regime's lack of a unified cultural policy. Historian Caterina Preda argues that three (at times contradictory) ideologies combined to shape official Chilean culture under the dictatorship. *Nationalist-authoritarianism*

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[73] Schumacher, *La Música Electroacústica en Chile*, 59.

[74] Martín Alejandro Fumarola, "Electroacoustic Music Practice in Latin America: An Interview with Juan Amenábar," *Computer Music Journal* 23, no. 1 (Spring 1999): 47.

[75] Schumacher, *La Música Electroacústica en Chile*, 60.

advocated for “classical, occidental Christian values” that glorified Chile’s past and were represented by opera, ballet, and classical theater. This overlapped with *traditional Catholicism*, which advocated for an "elitist, selective, superior culture" and a transcendent conception of "art for art's sake," untouched by political or social concerns.[76]

Paradoxically, the third pillar of Pinochet's cultural policy was *neoliberalism*, which positions the free market as the arbiter of social and cultural life and views art as a commodity. Pinochet’s closest economic advisors, including Sergio de Castro, Miguel Kast, and José Piñera were all students of American economist Milton Friedman at the University of Chicago, which had an affiliate program at Chile’s Catholic University. These “Chicago Boys” were responsible for dismantling much of the welfare state that had existed since the early twentieth century in favor of a laissez-faire, deregulated, and heavily privatized economy.[77]

Cultural theorist Alessandro Fornazzari describes Chile under Pinochet as a kind of extreme neoliberal experiment, a testing ground for Chicago School economic ideas that presaged Reaganism-Thatcherism in the anglophone world. Glossing Fredric Jameson, he argues that culture under neoliberalism can be described through “dedifferentiation”—everything (including commodity production) becomes cultural and culture becomes profoundly economic.[78] This results in a breakdown between the socio-cultural and economic spheres and economics comes to dominate the entirety of human activity. As an outgrowth of this dedifferentiation, intellectual work (e.g. the type of academic music-making and technological research of the early Chilean electronic musicians) gets lumped in with other forms of labor. Pure intellectual labor, argues

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[76] Preda, *Art and Politics under Modern Dictatorships*, 88.

[77] Valerie Brender, “Economic Transformations in Chile: The Formation of the Chicago Boys,” *The American Economist* 55, no. 1 (2010): 111–22.

[78] Alessandro Fornazzari, *Speculative Fictions: Chilean Culture, Economics, and the Neoliberal Transition*, Illuminations: Cultural Formations of the Americas (Pittsburgh, Pa: University of Pittsburgh Press, 2013), 7.

Fornazzari, has been replaced by experts who “give an academic veneer to the political projects of the neoliberal state and business nobility.”[79]

Official culture under Pinochet was thus a strange combination of classical and elitist art supported by private donors combined with commercial mass entertainment. The junta was especially supportive of television soap operas.[80] In the mid-1970s, Chilean electronic music was not yet at a stage of development to fit within any of these opposing ideologies. It was new and experimental, and thus had no of the classicist-traditionalist cultural capital, even though many electronic musicians worked within official institutions like the Universidad de Chile. It remained a niche practice among specialized technicians and engineers had not yet developed to the point where electronic music could be commodified by the free market.

In 1975, the junta imposed a cultural program designed to purge Chilean culture of "Marxism and foreign elements" and reestablish the "values of the 'Christian occident' to which Chile belonged." [81] This cut off many Chilean artists and researchers from cultural contact with other countries, and certainly impeded the technological developments of Asuar and others, who worked developed in correspondence with foreign colleagues.

The universities, publicly funded since the mid-nineteenth century, were privatized by 1980 and emphasis was placed on career training over research and experimentation. This had a profound effect on art and music, since these cultural endeavors were seen as unprofitable in the private sector.[82] The Sound Technology degree program was shuttered in 1976. Music Composition and Musicology stopped being offered 1982. These were replaced by a less-specialized music degree that featured a “sound workshop” course, though the goal of this program was to prepare students for careers in radio and television, rather than artistic

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[79] Ibid., 113.

[80] Preda, *Art and Politics Under Modern Dictatorships*, 109.

[81] Ibid., 105.

[82] Ibid., 97.

exploration.[83] The Chilean Music Festivals and Instituto de Extensión Musical ceased during the dictatorship. While Chilean composers of the 1960s and early 1970s were adopting the newest techniques and technologies of the international avant-garde, but according to Chilean composer Federico Schumacher, "Chile skipped over the most important *isms* of the eighties."[84] What little new music that was composed in Chile under the dictatorship was often in neoclassical styles that recalled the music of early twentieth-century Chilean composers.

COMDASUAR

Pinochet's policies stifled academic research and experimentation, but his economic advisors actively encouraged citizens to spend money on products and opened up markets to foreign imports. The availability of consumer electronics may have indirectly contributed to Asuar's last great computer-music achievement: a musical computer developed in 1978 called the COMDASUAR (Computador Musical Digital Analogico Asuar). Unlike the earlier mainframe computers that Asuar used for *Formas, Buffalo '71*, and *El Computador Virtuoso,* the COMDASUAR was built around the Intel 8080, a commercially-available microprocessor that found its way into countless consumer electronics in the 1980s. Like his earlier projects, this system used digital-to-analog converters to allow computer control over an analog synthesizer. Asuar used a standard QWERTY keyboard and TV monitor, so the COMDASUAR could also be considered an early personal computer. All of the components to build the COMDASUAR cost less than US$1000 in 1978.[85]

The COMDASUAR could perform pre-programmed scores automatically with up to six voices of polyphony. It could control the timbre of each voice independently and perform

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[83] Schumacher, *La Música Electroacústica en Chile*, 73.

[84] "Chile se salta olímpicamente el más importante de los *ismos* de los ochenta," ibid., 60.

[85] Martín Alejandro Fumarola, "Report of the COMDASUAR: A Significant and Unknown Chilean Contribution in the History of Computer Music," in *Proceedings of the International Computer Music Conference* (ICMC, Ann Arbor, Michigan, 1998), 2.

expressive effects like portamento and vibrato. In addition to its performance and playback capabilities, it could be used as a creative tool and included functions for probabilistic, algorithmic, and stochastic composition, including the ability to automatically generate canons, retrogrades, and serialist or set theory processes. It produced sounds in "real time," which allowed the user to modify musical results as they are being played, foreshadowing later advances in live coding and computer improvisation.[86]

Asuar combined American and Spanish-language conventions in the COMDASUAR software. For example, durations are expressed using the Spanish names *redonda, negra, semicorchea*, etc., whereas pitches are indicated as letter names (C, D, E, F, G, A, B). The COMDASUAR was designed to run quickly and efficiently on a microcomputer and stored programs and data on cassette tape. This efficiency was achieved through creative ways of eliminating redundancy—for example, if a pitch was repeated, it was not necessary to re-indicate the pitch of a repeated note in the digital score.[87]

All of Asuar's final compositions used the COMDASUAR, including the 1982 pieces *Una flauta en el camino* and *Elegía*, and *En el jardín* from 1986. In 1979, he released the LP *Así habló el computador* (*Thus Spoke the Computer*, a nod to Strauss and Nietzsche) which, like *El Computador Virtuoso*, featured accessible computer music in popular styles on one side and a demonstration of the COMDASUAR on the other.

Despite the singular technological achievement of this invention, Asuar was creatively isolated and lacked institutional support to continue his research and experimentation. After creating his final piece, *En el infinito*, in 1987, he gave up music and retreated completely from

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[86] Martín Matus Lerner, "Latin American NIMEs: Electronic Musical Instruments and Experimental Sound Devices in the Twentieth Century," in *Proceedings of New Interfaces for Musical Expression* (Porto Alegre, Brazil, 2019), 232; Albornoz, "Computer Music in Chile: The Beginning and Some Paths to Nowadays," 8-9.

[87] Fumarola, "Report of the COMDASUAR," 3; José Vicente Asuar, "Haciendo Música Con Un Computador," *Revista Musical Chilena* 27, no. 123 (1973): 81–82.

public life. He only reemerged when filmmaker Carlos Lertora interviewed him for the 2013 documentary film *Variaciones Espectrales* and, with the help of the Comunidad Electroacústica de Chile, helped organize the first public performances of Asuar's works in decades.[88]

End of Dictatorship

When it seized power in 1973, the military junta nullified the 1925 constitution and ruled the country by force. In 1980, the regime put forth a new constitution to legitimize Pinochet's presidency and called for elections to be held every eight years. Few expected Pinochet to be unseated in the 1988 election, but the intervening years brought economic crises due to the Chicago Boys' aggressive "credit card capitalism."[89] The Catholic Church began speaking out against human rights abuses and even Pope John Paul II called Pinochet a dictator.[90]

The general had lost the majority support of the military when his reelection came up and the United States, recognizing the brutality of his leadership, was no longer willing to provide the support it did in the early 1970s.[91] In the 1988 plebiscite vote, a majority of Chileans voted "no" to another eight years of Pinochet and elected Patricio Alwyn from the moderate-left Concertación coalition as president. Pinochet made a meager attempt to hold on to power, but he no longer had the loyalty of the military or a secret police force.

Return to democracy did not occur overnight. The 1980 constitution made former presidents senators for life and Pinochet remained commander-in-chief of the armed forces until 1998, which provided him immunity from prosecution. He was arrested in London in 1998 on human rights abuse charges stemming from events that took place during the 1973 Caravan of Death. In 2000, the constitution was amended to allow Pinochet to face charges and

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[88] Carlos Lertora, *Variaciones Espectrales*, Documentary (Dereojo Comunicaciones, 2013), https://vimeo.com/124843030.

[89] Fornazzari, *Speculative Fictions*, 5.

[90] Rector, *History of Chile*, 208.

[91] Ibid., 210.

he was extradited back to Chile. A lengthy legal battle ensued and Pinochet died in 2006 before he could be convicted on any charges.[92]

AFTERMATH

The history of Chilean electronic music, like so much else in Chile's recent past, is divided into two acts. The first begins in the 1950s with a flood of enthusiasm and activity. Under Pinochet's rule, this flood slowed to a trickle before running dry. It is a narratively unsatisfying conclusion. Despite the bloodshed and terror of the coup and subsequent military junta, there are no martyrs or heroes, no formal censorship, no catastrophe that brought this first stage of Chilean electronic music to a dramatic end. Rather, the cultural, economic, and institutional reforms of the Pinochet era made Chile an inhospitable environment for the experimentation, creativity, research, and international dialogue that fueled the first three decades of its electronic music. The figures who carried on were forced to do so in exile, finding asylum and institutional support abroad. Most never returned. The preeminent pioneer who chose to remain, José Vicente Asuar, simply gave up at what could have been the height of his career, unable to continue his work in isolation.

The second act begins after the fall of the military regime. In 1991, Juan Amenábar secured funding to establish the Gabinete Electroacústica para la Música de Arte (Electroacoustic Cabinet for Art Music, GEMA). This new facility was equipped with the latest in music technology, including a Macintosh computer, Ensoniq and EMax samplers, a multitrack tape machine, and the Max software developed by American programmer Miller Puckette.[93] A new generation of student composers went to work creating electronic music at this basement facility at the University of Chile.

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[92] Patricio Silva, "Augusto Pinochet: The Emergence of One-Man Rule in Chile (1915-2006)," in *Dictators and Autocrats* (London: Routledge, 2021), 71–90.

[93] Schumacher, *La Música Electroacústica en Chile*, 75.

And yet, music technology had changed considerably since the early seventies. It was no longer the exclusive domain of academic composers and engineers and no longer required conservatory training or a degree from a prestigious university.[94] Electronic music had entered the mainstream in the intervening years—drum machines and synthesizers could be heard everywhere on eighties pop hits. These music machines were also no longer custom-built, one-of-a-kind creations like the COMDASUAR. All of the equipment and software required to make electronic music was now commercially available and could be easily purchased and imported from North America, Europe, or Japan.

The post-1990 generation of Chilean electronic musicians grew up in a commercialized, market-driven economy, and cosmopolitan pop music, rather than homegrown experimentation, was their point of aesthetic departure.[95] In 1994, diasporic Chileans in Germany organized a rave that was held in the Atacumba Desert during a solar eclipse. The Arica Eclipse Rave was sponsored by German fashion brand Pash and featured prominent Detroit techno artists, German DJs, and Chilean-Germans like Ricardo Villalobos. This event brought North American and European electronic dance music to Chile for the first time and has achieved mythical status in the history of Chilean electronic music. It led a new generation of aspiring DJs and producers to begin making EDM in their own country.[96]

Meanwhile, the pioneering work of García, Amenábar, Brnčić, Becerra, and Asuar was all but forgotten. Only in the early 2000s did Chilean composer-scholars like Alejandro Albornoz, Federico Schumacher, Claudio Fuentes, and Martín Fumarola, with the help of the Comunidad Electroacústica de Chile, begin unearthing, documenting, and archiving the early history of their

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[94] Alejandro Albornoz, "Música y Tecnología En Chile: Reflexiones Sobre Su Desarrollo e Implicancias Culturales," in *Instalando: Arte & Cultura Digital*, ed. Ignacio Nieto, Italo Tello, and Ricardo Vega (Santiago: LOM Ediciones, 2007), 32.

[95] Albornoz, "Computer Music in Chile," 12.

[96] Matthias Pasdzierny, "Transatlantic Techno Myths: The 1994 Arica Eclipse Rave as an Example of the History and Historiography of Electronic Dance Music between Chile and Germany," *Twentieth-Century Music* 17, no. 3 (October 2020): 419–33.

country's electronic music. Argentinian archivist Ricardo Dal Farra, whose country endured similar political turmoil in the late twentieth century, found that it was easier obtain music by European and North American composers than by those in his hometown of Buenos Aires.[97] In an introduction to his Latin American Electroacoustic Music Collection archival project, he writes:

> What happened then to all the music recordings, the research projects, the technical resources, the experience and the accumulated knowledge? There is no simple answer, but the complex relationships between the economic, political, cultural, and social spheres of the time provides a clue.[98]

This loss of cultural knowledge has led to the false impression that electronic music practice began in Europe and North America before spreading to South America, when in reality, there were significant technological and artistic developments happening in Chile as early as the 1950s. This history should not be "disappeared," like so much else from the Pinochet era. The internationally-acclaimed work of José Vicente Asuar, in particular, deserves to stand alongside that of Hiller, Stockhausen, Boulez, and Xenakis, seminal figures who, by all accounts, considered Asuar a peer and collaborator.

Current Chilean electronic music historians are careful to not narrate the past through rose-colored lenses nor overstate the effects of the coup and subsequent dictatorship. Electronic music was never formally censored under Pinochet, nor it was it ever directly supported by the Allende government. Even though Pinochet's university policies did away with the specialized Sound Technology degree, the generalized Bachelor of Music allowed students to study at the University of Chile even if they did not have elite conservatory training, which in earlier decades was only accessible to Santiago elites.[99] Schumacher

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[97] Dal Farra, "Un voyage du son par les fils électroacoustiques," xx.

[98] Ricardo Dal Farra, "Something Lost, Something Hidden, Something Found: Electroacoustic Music by Latin American Composers," *Organised Sound* 11, no. 2 (2006): 137.

[99] Ibid., 74.

acknowledges that there was no direct cause-and-effect relationship between military rule and the demise of experimental electronic music.[100]

The first generation of electronic music in Chile was shaped by changing cultural values enforced by political and economic policies. A robust network of state-supported universities, music schools, and cultural institutions gave conservatory-trained composers a platform for experimentation and research, as well as an outlet to publish their findings and performances. From the 1950s through the early 1970s, this network was the springboard that electronic musicians relied on as they traveled around the world composing and conducting research. The unofficial "ministry of culture" insulated these academic musicians from the vagaries of the free market and political change, and Chilean musicians had the freedom to pursue large-scale projects like the *Formas* pieces and establish degree programs to train the next generation of electronic musicians. Though these efforts took place mostly within the halls of academia and in elite art music circles, by the end of the Allende presidency, Asuar had also made overtures to the general public with *El Computador Virtuoso*.

The swift onset of military rule revealed the precariousness of this situation. The close ties between official cultural institutions and the national government became a liability for figures like Gustavo Becerra and Fernando García, since their administrative roles were seen as support for the Unidad Popular government. The international connections that had made possible a two-way exchange of ideas meant that Ivan Pequeño, Jorge Arriagada, Léon Schidlowsky, and Leni Alexander could continue their careers abroad after the coup. But those who remained in Chile were essentially cut off from the international electroacoustic community. The privatization of education and emphasis on job training over research and experimentation left few opportunities for electronic composition in Chile's universities. And electronic music, which was still fledgling on the periphery of the art music establishment at

[100] Schumacher, *La Música Electroacústica en Chile*, 58.

the time of the coup d'état had no apparent value in the free market. Under the neoliberal economic model and without state support the development of electronic music ceased.

Both the fruitful early period of Chilean electronic music and the barren Pinochet era reveal how technology and music intersect with politics and economics. The political turmoil in late twentieth-century Chile had both material and symbolic effects on music technology. Chilean electronic musicians made significant advances in the area of computer-assisted composition. These developments were halted under Pinochet and computer music developed elsewhere in the late 1970s and 1980s without the input of some of its earliest pioneers. Gustavo Becerra, in his works with texts by Pablo Neruda, provided a model for a distinctly Chilean electronic music practice and Chilean composers helped establish music technology labs and studios throughout South America. The political turmoil on the continent meant that South American musicians were largely absent from the international electroacoustic community in the 1980s, when electronic music entered the mainstream. Rather than continuing a musical tradition that began in the 1950s, contemporary Chilean electronic musicians have had to uncover a lost history and synthesize this lineage with musical practices imported from abroad. Though several decades have passed since the end of military rule, the influence of political and economic policy in the twentieth century has had lasting effects on Chilean electronic music.

Conclusion

The musicians discussed in these three case studies used technological and scientific breakthroughs to develop new forms of musical expression that have had lasting effects. And yet, as the preceding chapters have shown, their use of technology cannot be explained solely in relation to scientific principles. Instead, the subjects of these chapters were influenced by social forces like gender norms, race relations, and politics, and they produced technologically-mediated music in response to their respective cultural contexts. Writing on the subjective and interpretive nature of music historical criticism, Leo Treitler argues that "Knowing is an active process of assimilation that incorporates an act of appraisal."[1] Understanding the work of the figures in this thesis requires active interpretation and their work becomes meaningful only when enmeshed in a fabric of sociocultural relations.[2]

Music is an embodied, social activity shaped by traditions, taste, and individual creativity. It lends itself to interpretation through a cultural lens. But the centrality of technology in these case studies complicates the assertion that this music is best understood within a web of signification.[3] Technology may be considered the functional application of scientific discoveries. In this view, technology is bound by the immutable laws of nature and not subject to the vagaries of societies and cultures.[4] Treitler himself conflates the technological apparatus of the combustion engine with the physical reality that water freezes at 32°F and uses this observation to argue that technology and music require different analytical

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[1] Leo Treitler, "On Historical Criticism," *The Musical Quarterly* 53, no. 2 (April 1967): 191.

[2] Gary Tomlinson, "The Web of Culture: A Context for Musicology," *19th-Century Music* 7, no. 3 (April 1984): 351.

[3] Clifford Geertz, "Thick Description: Toward an Interpretive Theory of Culture," in *The Interpretation of Cultures: Selected Essays* (New York: Basic Books, 1973), 311.

[4] Steve Woolgar, "The Turn to Technology in Social Studies of Science," *Science, Technology, & Human Values* 16, no. 1 (January 1991): 30.

approaches.[5] Cause-and-effect relationships between scientific phenomena can be verified through empirical observation but, argues musicologist Gary Tomlinson, such interpretive methods are insufficiently "thin" to account for the meaning and significance of music in a cultural-historical context.[6]

Despite the fact that Les Paul, Sun Ra, and Chilean electronic music composers all engaged with technology, their work is not reducible to empirical observations or even rational explanations of causality. The way in which Les Paul presented his musical inventions in gendered terms, as inscrutable or even dangerous to women, is easily disproven by comparing his work with contemporaneous female music technologists like Daphne Oram or Bebe Barron.[7] Even his wife Mary Ford was a virtuoso electric guitarist, so much so that he unplugged her instruments on stage to maintain the illusion that he was musically and technologically superior to her. The development of computer music in Chilean universities ended not because of inherent technological or scientific limitations. Computer music continued to develop throughout the world while Chilean electronic musicians were cut off from international contact. And Sun Ra's afrocentric space program seemed absurd in the 1950s, when many Black Americans still suffered under Jim Crow and lacked the right to vote, much less travel to outer space. His reconception of space travel defies rational explanation when one only considers the empirically-observable historical facts, which is why Sun Ra is included in many afrofuturist discussions of Black science *fiction*.[8]

Positivist-empiricist interpretations fail to account for the significance of technology as a thread in a broader web of culture. When *technology* is used as a synecdoche for fixed,

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[5] Treitler, "On Historical Criticism," 190-91.

[6] Tomlinson, "The Web of Culture," 354.

[7] Chantelle Gray, "A Hauntology of Clandestine Transmissions: Spectres of Gender and Race in Electronic Music," *Indian Journal of Gender Studies* 29, no. 3 (October 2022): 322.

[8] Mark Dery, "Black to the Future: Interviews with Samuel R. Delany, Greg Tate, and Tricia Rose," in *Flame Wars: The Discourse of Cyberculture* (Durham & London: Duke University Press, 1994), 179–222.

scientific laws of nature, it becomes an abstraction, floating above society but not embedded in it. This conception leads to technologically determinist thinking and overly simplistic explanations of technology's effects on music.[9] It is clear that the episodes described in the preceding chapters would not have occurred as they did without the transformative effects of technology and that the introduction of technology into musical practice precipitated real changes. Yet the subjects of these case studies were actively involved in defining the function and meaning of technology in their respective works. The musicological challenge becomes how to weave technology into the tapestry of culture while avoiding the extremes of both technological determinism and radical social constructivism.

FACTS AND ARTEFACTS

Reconciling the technological with the social is a chief concern in science and technology studies, which offers insights into how technology may be considered within historical musicology. Eschewing the conception of technology as a disembodied, transhistorical force, sociologists Trevor Pinch and Wiebe Bijker argue that every technology consists of both a material manifestation (an *artefact*) and a body of knowledge (*facts*) involved in the creation and use of a technological innovation.[10] This bipartite conception of technologies renders them more fluid and social; new technologies bring with them new ways of thinking and changes in cultural knowledge can inspire new inventions as well as ways of redeploying and recreating existing technologies.[11]

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[9] Bennett Hogg, "Music Technology, or Technologies of Music?," in *The Cultural Study of Music: A Critical Introduction*, ed. Martin Clayton, Trevor Herbert, and Richard Middleton (London: Routledge, 2011), 218.

[10] Trevor J. Pinch and Wiebe E. Bijker, "The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," *Social Studies of Science* 14, no. 3 (1984): 419-420.
I use the spelling "artefact" throughout in reference to Pinch and Bijker.

[11] Rayvon Fouché, "Say It Loud, I'm Black and I'm Proud: African Americans, American Artifactual Culture, and Black Vernacular Technological Creativity," *American Quarterly* 58, no. 3 (2006): 642.

Conceiving of technologies as carriers of knowledges makes investigating how they function in social formations an epistemological, rather than a scientific question.[12] In discussing the *facts* embedded in technology, Pinch and Bijker put forth a broad definition of knowledge, arguing that there is "nothing epistemologically special about the nature of scientific knowledge; it is merely one in a whole series of knowledge cultures."[13] What constitutes *knowledge* is more than just awareness of empirically-verifiable truths; the term "knowledge cultures" encompasses values, tastes, prejudices, beliefs, and more. All of these different forms of cultural knowledge influence the meaning attached to technologies and may also shape the development of technological *artefacts*. To illustrate this point, Langdon Winner describes how political motives sparked the development of pneumatic molding machines in 1880s Chicago. Factory owners, concerned by demands made by labor organizers, invested in this new, expensive technology because it allowed them to replace union members with unskilled, non-union workers.[14] Citing the division of labor on American farms in the early 1900s, Ronald Kline and Trevor Pinch describe how gender roles influenced the early design of the automobile while simultaneously reinforcing notions of men's and women's work.[15] When technologies leave the laboratory and enter the cultural sphere, they undergo a constant renegotiation of *facts* and *artefacts*.[16] This reframing takes technology out of the realm of natural laws and situates it instead in culture. Steve Woolgar's summary of Winner's social-constructivist theory of technology bears striking

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[12] Woolgar, "The Turn to Technology," 25.

[13] Pinch and Bijker, "Social Construction of Facts and Artefacts," 401.

[14] Langdon Winner, "Do Artifacts Have Politics?," *Daedalus* 109, no. 1 (Winter 1980): 124-5.

[15] Ronald Kline and Trevor Pinch, "Users as Agents of Technological Change: The Social Construction of the Automobile in the Rural United States," *Technology and Culture* 37, no. 4 (October 1996): 780.

[16] Stewart Russell, "The Social Construction of Artefacts: A Response to Pinch and Bijker," *Social Studies of Science* 16, no. 2 (May 1986): 337.

similarities to Clifford Geertz's interpretive theory of culture: "What matters is not the technology itself but but the social or economic systems in which it is embedded."[17]

The subjects of the preceding chapters all engaged with technology at different points along the *fact-artefact* continuum. This accounts, in part, for the different ways that technology manifested in their musical work. Before electronic music could exist in Chile, musicians there needed the technical means to synthesize and manipulate sound. Juan Amenábar and Jose Vicente Asuar drew upon their training as engineers to redeploy the Radio Chilena studio for the creation of electronic music and later built a workshop and equipment at Santiago's Catholic University. At this early stage, they dealt primarily with technological *artefacts* and applied scientific knowledge to the development of tools for music creation. This project continued as they oversaw or inspired the construction of similar facilities in Karlsrühe, Caracas, and Buenos Aires. As electronic music evolved over the coming decades, their concerns became less technical and more aesthetic in nature, and incorporated different forms of cultural knowledge. Asuar, in particular, created *El Computador Virtuoso* to appeal to a wider audience as well as educate the public about his methods.

In contrast with the Chilean engineer-composers, who were actively involved in creation of technological artefacts, Sun Ra was concerned primarily with cultural knowledge. Though he played no material role in the U.S. space program, his afrocentric reconception of space travel redefined the cultural meaning of technological progress for African Americans. Musicologist Daniel Kreiss describes his mission as the creation of a "Black knowledge society" that would bring about social change through myth and metaphor.[18] Even though Sun Ra did not primarily interact with technology in a physical sense, his contributions to the cultural study of music and technology are no less significant. By instead engaging with the *facts* of Black history,

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[17] Woolgar, "The Turn to Technology," 31

[18] Daniel Kreiss, "Appropriating the Master's Tools: Sun Ra, the Black Panthers, and Black Consciousness, 1952-1973," *Black Music Research Journal* 28, no. 1 (Spring 2008): 61.

music, and culture, Ra produced new, innovative meanings that reframed the relationship between Blackness and technology.

Les Paul's material inventions were central to the New Sound, but he also worked to define how his inventions would be understood by the public. He was concerned with both the production of *artefacts* and knowledge. Fabrications like the Les Paulverizer and the secrecy surrounding the New Sound obscured the technical characteristics of his inventions and reinforced his inventor-genius persona. His performance of gender and domestic space with Mary Ford presented technological proficiency as a masculine characteristic while relating it to division of labor in the home.

Interpreting how technology functions differently within different musical cultures involves identifying social formations that are defined by their relationship to a technology.[19] This, too, is linked to knowledge cultures and technological *facts*. In their theory of the social construction of technology, Pinch and Bijker define *relevant social groups* as knowledge cultures in which members share the same set of meanings and values attached to a technological *artefact*.[20] The differing norms, beliefs, and value systems within social groups, as well as power dynamics *between* groups accounts for the variety of roles that technologies play in different social situations.[21] Social groups are fluid, since they are organized around mutable interpretations of technology and, especially in the case of art and music, individuals and social groups may actively redefine their own relationship to technologies.[22]

Though the preceding case studies are loosely contemporaneous, each involves quite different social groups. It was a widely-held sentiment among the Black community on the

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[19] Rob Kling, "Audiences, Narratives, and Human Values in Social Studies of Technology," *Science, Technology, & Human Values* 17, no. 3 (July 1992): 354.

[20] Pinch and Bijker, "Social Construction of Facts and Artefacts," 414.

[21] Kline and Pinch, "Users as Agents of Technological Change," 768.

[22] Fouché, "Say It Loud, I'm Black and I'm Proud," 646.

South Side of Chicago that the Space Race was a distraction from the plight of African Americans in the 1950s.[23] For Sun Ra, as well as the Black radical groups in Washington Park, space travel was an extension of "white science" that had justified systemic racism and destroyed Black communities.[24] The Arkestra was a product of a knowledge culture organized around this understanding of technological progress. However, Sun Ra subverted this belief by reconceptualizing the relationship between Blackness and modernization. In doing so, he created a new, afrocentric knowledge culture that saw the Space Age as an opportunity for racial uplift. This interpretive flexibility is a characteristic of what science and technology scholar Rayvon Fouché calls *Black vernacular technological creativity*. By upending dominant meanings of technological *artefacts*, marginalized groups redefine the significance of technologies for themselves.[25]

Unlike Sun Ra, whose primary audience was African Americans who held pessimistic views toward technology, Les Paul wanted to appeal to suburban, white Americans who benefitted most from the technological advances of the postwar era. This knowledge culture was shaped not only by new technological *artefacts* in their homes, but by an advertising industry that promoted science as a symbol of progress and prosperity.[26] Paul, like many of the early developers of the electric guitar, was first introduced to electronics as an amateur radio hobbyist. In the 1920s and 30s, "tinkering" with radios legitimized music appreciation for men

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[23] Lynn Spigel, "Outer Space and Inner Cities: African American Responses to NASA," in *Welcome to the Dreamhouse: Popular Media and Postwar Suburbs* (Durham & London: Duke University Press, 2001), 141–84.

[24] Daniel Kreiss, "Appropriating the Master's Tools: Sun Ra, the Black Panthers, and Black Consciousness, 1952-1973," *Black Music Research Journal* 28, no. 1 (Spring 2008): 61.

[25] Fouché, "Say It Loud, I'm Black and I'm Proud," 646.

[26] Michael L. Smith, "Selling the Moon: The U.S. Manned Space Program and the Triumph of Commodity Scientism," in *The Culture of Consumption: Critical Essays in American History 1880-1980*, ed. Richard Wightman Fox and T.J. Jackson Lears (New York: Pantheon Books, 1983), 175–210.

because it required active engagement with machines.[27] By the 1950s, the hi-fi stereo served the same purpose with the same gendered connotations.[28] The gender norms and values of these social groups reached a broader audience when Les Paul presented his inventions in broadcast performances with Mary Ford.

In the 1950s, Chilean composers were also motivated by a kind of technoutopianism, but one that was quite different from Les Paul's desire for commercial success. Musical modernism, with its avant-garde emphasis on rationality and progress, was an important early influence on the Chilean electronic music pioneers after Pierre Boulez visited Santiago in 1953. Electronic music was an extension of the rational, serialist style of music taught by Carlos Isamitt and Fré Focke at the National Conservatory of Chile. Anthropologist Georgina Born, in her study of the institutionalization of electronic music, describes the modernist tendencies of the 1950s as antithetical to popular culture.[29] The earliest Chilean composers and engineers were insulated from popular culture due to their positions in academia, which allowed them to pursue technical developments without having to appeal to the general public. Though this situation would change over the following decades, figures like Gabriel Brnčić and Jose Vicente Asuar became a part of a cosmopolitan knowledge culture that valorized technological progress.

AGENCY AND AFFORDANCES

By reframing technologies as both material *artefacts* and the products of knowledge cultures, it becomes possible to integrate technology into the social web of signification. The interpretive flexibility of technologies has led some radical social constructivists like Keith

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[27] Monique Bourdage, "From Tinkerers to Gods: The Electric Guitar and the Social Construction of Gender," *Historical Studies Journal* 24 (2007): 17.

[28] Keir Keightley, "'Turn It down!' She Shrieked: Gender, Domestic Space, and High Fidelity, 1948-1959," *Popular Music* 15, no. 2 (May 1996): 149–77.

[29] Georgina Born, *Rationalizing Culture: IRCAM, Boulez, and the Institutionalization of the Musical Avant-Garde* (Berkeley, Calif.: Univ. of California Press, 1995), 45.

Grint and Steve Woolgar to propose that technologies should be treated like texts.[30] However, technologies differ from other cultural objects because they possess a fixed, material presence that acts upon other objects or people in specific ways. Even though technologies may be modified and redeployed by their users, every *artefact* has physical limitations; a bicycle cannot allow its user to fly.

To reconcile social constructivism with the "essential technical" properties of *artefacts*, sociologist Ian Hutchby proposes that technologies should be considered in terms of their *affordances*.[31] The concept of affordance is borrowed from psychologist James Gibson and refers (in Hutchby's case) to the set of actions made possible by the use of a technology.[32] Considering affordances limits the possible cultural interpretations of a technology to those that are physically possible while also highlighting how technologies augment human action. The concept of affordances also intersects with the notion of *agency*. Agency is not simply intention or will; it is, according to musicologist Ingrid Monson, "the socioculturally mediated capacity to act."[33] Technologies afford individuals and groups possibilities for action that would not be possible *without* the use of technology. Anthropologist Bruno Latour writes that "Agency is not simply a property of humans *but of an association of actants*."[34] For this reason, technology is one of many sociocultural mediators that determine agency in a given formation.

Both agency afforded by technology as well as agency related to other sociocultural forces like racism, politics, and gender norms, are central themes throughout this thesis. All of the

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[30] Keith Grint and Steve Woolgar, *The Machine at Work: Technology, Work, and Organization* (Cambridge, UK; Malden, MA: Blackwell Publishers: Polity Press, 1997).

[31] Ian Hutchby, "Technologies, Texts and Affordances," *Sociology* 35, no. 2 (May 2001): 444.

[32] Ibid., 447.

[33] Ingrid Monson, "Hearing, Seeing, and Perceptual Agency," *Critical Inquiry* 34, no. S2 (January 2008): S37; Laura M. Ahearn, "Language and Agency," *Annual Review of Anthropology* 30, no. 1 (October 2001): 109–137.

[34] Bruno Latour, *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge, Mass.: Harvard Univiersity Press, 1999), 182.

figures in the preceding chapters engaged with technology because it afforded them new possibilities for musical expression. They sought out technology (even as a metaphor) because it gave them agency to create music that would not be possible without it. Yet, technology is only one thread entangled in a broader web of relations that determine one's "socioculturally mediated capacity to act." In these case studies, we see musicians struggling to attain agency, maintain agency, and losing agency and can observe how agency and affordances affected their music.

Sun Ra's early life in Birmingham and Chicago was a quest to attain agency inspired by the racial uplift initiatives he experienced in Alabama. There, he saw an autonomous Black public sphere, where African Americans had the agency to open shops, public newspapers, and read in libraries. Under the tutelage of his mentor Fess Whatley, he found that he could achieve some measure of agency through music. But in Birmingham, these glimpses of autonomy were always overshadowed by the threat of Klan terror and Jim Crow laws that kept Black Alabamans disenfranchised. The situation was only marginally better in Chicago. Though segregation was not formalized into law as it was in the South, redlining and urban renewal initiatives in the 1950s limited opportunities for Black Chicagoans and restricted where they could live.

The Space Race gave Sun Ra the opportunity to claim the agency that had been denied him his entire life. He read the grand promises of space travel, that it would "free man from his remaining chains," and saw parallels to Booker T. Washington's vision for the New South that shaped his youth.[35] Through economic and racial disenfranchisement prevented him participating in the space race in a material sense, he coopted the agency afforded by space travel for African Americans like himself. The Arkestra's ecstatic displays of collective improvisation and futuristic imagery were a celebration of the agency and autonomy that space travel symbolized.

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[35] Walter Sanders, "The Seer of Space: Lifetime of Rocket Work Gives Army's Von Braun Special Insight Into the Future," *LIFE*, November 18, 1957.

Les Paul mastered electronics from an early age and his success performing and recording with homemade solid-body electric guitars revealed to him that technology could increase his opportunities as a musician. But when other guitarists used the same instruments, he found that he could be easily imitated and that technologically-afforded agency was not enough to maintain an advantage over his competitors. When he developed the New Sound, he kept his methods a secret so that audiences would attribute musical agency to Les Paul the man and not his inventions. He had to constantly reiterate his helmsmanship over technology to assert his own agency,[36] and this motivated the public persona he cultivated in his broadcast performances with Mary Ford. She served as a foil to her inventor-genius husband by showing that technologically-afforded agency was not attainable by everyone. Their performance of domestic space reinforced postwar conceptions of male and female agency related to the home and technology. Ford, in her role as Paul's demure housewife, was limited in her capacity to act due to her household responsibilities and her bewilderment at his inventions, but technology afforded him the freedom to tinker, experiment, and create music.

The first generation of Chilean electronic musicians were able to pursue their research and experimentation through their associations with educational and artistic institutions. State support of universities and cultural programs gave them the agency to develop new technologies, facilities, and academic departments. Even though they pursued these endeavors in dialogue with an international network of electronic musicians, the sociopolitical and economic circumstances in Chile made it possible for them to develop a robust body of knowledge and musical work that spread to other countries. The onset of military rule and laissez-faire economic reforms striped Chilean composers of the agency to continue their work with electronics. The privatization of cultural programs and military oversight of universities

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[36] Michael L. Smith, "Selling the Moon: The U.S. Manned Space Program and the Triumph of Commodity Scientism," in *The Culture of Consumption: Critical Essays in American History 1880-1980*, ed. Richard Wightman Fox and T.J. Jackson Lears (New York: Pantheon Books, 1983), 184.

effectively eliminated the institutional support that they relied on. The restrictions on travel cut Chileans off from the international knowledge culture that helped inform their technological developments. Sociopolitical circumstances gave the Chilean pioneers the freedom to innovate with music technology before 1973, but the rapid political and economic changes instituted by the military junta limited their agency after the coup d'état.

EFFECTS AND LEGACY

The cultural effects of technologies are most apparent when they are new.[37] The introduction of new technologies into the cultural sphere in the mid twentieth century precipitated the music discussed in this thesis. Once technologies become woven into the social fabric, it becomes more difficult to isolate their role in culture. Sound studies scholar Jonathan Sterne describes technologies as "crystallized bits of practical art and practical reason."[38] This crystallization process makes social norms and cultural knowledge durable by externalizing and delegating them to material *artefacts*.[39] Applying the methods of science and technology studies to the historical study of music helps reveal how values, beliefs, and knowledge crystallize within a culture. All three of the case studies in this thesis have had long-lasting effects. Articulating the role of technology in the web of culture through historical case studies can lead to an understanding of what makes musical practices and cultures durable and unique.

The Gibson company still manufactures and sells the Les Paul signature guitar that was first introduced in 1952. Paul's contributions to music technology are embedded in the instrument that bears his name. In the decades after the peak of Paul and Ford's success, the

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[37] Timothy Dean Taylor, *Strange Sounds: Music, Technology & Culture* (New York: Routledge, 2001), 61.

[38] Jonathan Sterne, "Communication as Techné," in *Communication as…: Perspectives on Theory*, ed. Gregory J. Shepherd, Jeffrey St. John, and Ted Striphas (Thousand Oaks, Ca.: Sage Publications, 2006), 95.

[39] Bruno Latour, "Technology Is Society Made Durable," *The Sociological Review* 38, no. 1 (May 1990): 103–31.

electric guitar became associated with rock 'n' roll, prized for its ability to produce deafening volume levels, heavy distortion, and piercing feedback. The rock guitarists who could tame these powerful instruments became hailed as gods.[40] Though Paul himself was uninterested in the noise and distortion that became hallmarks of rock guitar playing, he never shied away from the associations with genius and the supernatural that came with technical mastery. Through the late nineteenth century and into the twenty-first, the acoustic guitar was a popular instrument for women. The electrification of the guitar by radio enthusiasts like Paul and Leo Fender transformed it into a *technology*, after which it was played almost entirely by men.[41] The rigid gender roles and associations with technological agency that were characteristic of the early postwar era became crystallized in the *artefact* of the electric guitar.[42]

Similar gendering effects took place with recording technology in pop music. Record producers and audio engineers are overwhelmingly male.[43] Mavis Bayton attributes this to lingering stereotypes about technological agency. In pop music, women are most often singers, where they are praised for their ability to perform artlessly and naturally, without the need to master instruments or technology.[44] The self-conscious artifice of record production, on the other hand, signals masculine agency.[45] Les Paul's New Sound recordings were among the first examples where recording technology was made audible to the listener, and the way that he and Ford presented his work demonstrates this distinction between agency and artlessness early in the history of pop music. In their radio performances, she was only a singer, while he was

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[40] Bourdage, "From Tinkerers to Gods," 21-22.

[41] Ibid., 26.

[42] Mavis Beayton, "Women and the Electric Guitar," in *Sexing the Groove: Popular Music and Gender*, ed. Sheila Whiteley (Routledge, 2013), 37–49.

[43] Paula Wolfe, "A Studio of One's Own: Music Production, Technology, and Gender," *Journal on the Art of Record Production*, no. 7 (November 2012).

[44] Mavis Bayton, "How Women Become Musicians," in *On Record: Pop, Rock, and the Written Word*, ed. Simon Frith and Andrew Goodwin (New York: Pantheon Books, 1988), 238–57.

[45] Wolfe, "A Studio of One's Own."

responsible for transforming her voice through his technological wizardry. Here, as with the electric guitar, the gendering of technological agency crystallized as recording technology became ubiquitous in music.

Sun Ra influenced numerous later musicians like Parliament-Funkadelic, Herbie Hancock, Kool Keith, and Janelle Monáe who all performed technology from an afrocentric point of view.[46] His Myth Science became a model for afrofuturism, which has influenced a large body of scholarship and artistic work. Afrofuturism has extended far beyond music and science fiction, and has inspired historical scholarship into the contributions of African American inventors.[47] Sun Ra rejected an essential incompatibility between Blackness and technological agency, and in doing so, opened the door to both new ways of imagining future technology as well as a critical reevaluation of the technologies of the past.

The long period of military rule halted the technological and progress made by the first generation of electronic musicians in Chile. The second generation of Chilean electronic musicians grew up in exile and first encountered music technology in European nightclubs, rather than the universities of Santiago.[48] In 1994, a number of second-generation émigré Chileans raised in Germany, including Matias Aguayo, Ricardo Villalobos, and Cristian Vogel, performed at a rave in the Atacumba Desert. This event has been described as the "first techno festival ever" in South America and redefined Chilean electronic music as the product of

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[46] Ytasha Womack, *Afrofuturism: The World of Black Sci-Fi and Fantasy Culture*, First edition (Chicago: Chicago Review Press, 2013), 51-76.

[47] Dann J. Broyld, "The Underground Railroad As Afrofuturism: Enslaved Blacks Who Imagined A Future And Used Technology To Reach The 'Outer Spaces of Slavery,'" *Journal of Ethnic and Cultural Studies* 6, no. 3 (December 18, 2019): 171; Joel Dinerstein, *Swinging the Machine: Modernity, Technology, and African American Culture between the World Wars* (Amherst: University of Massachusetts Press, 2003); Alondra Nelson, Thuy Linh N. Tu, and Alicia Headlam Hines, eds., *Technicolor: Race, Technology, and Everyday Life* (New York: New York University Press, 2001); Carroll W. Pursell, ed., *A Hammer in Their Hands: A Documentary History of Technology and the African-American Experience* (Cambridge, Mass: MIT Press, 2005).

[48] Matthias Pasdzierny, "Transatlantic Techno Myths: The 1994 Arica Eclipse Rave as an Example of the History and Historiography of Electronic Dance Music between Chile and Germany," *Twentieth-Century Music* 17, no. 3 (October 2020): 427.

transatlantic connections brought about by the political exile of the Pinochet era.[49] The Arica Eclipse Rave and the return of diasporic Chileans, which marked a symbolic end to military rule (even though Pinochet was unseated several years earlier), overshadowed the developments of the first generation of Chilean electronic musicians. The loss of cultural knowledge brought about by the political turmoil of the late twentieth century in Chile shaped the meaning and development of electronic music in the country. Through the 1990s and 2000s, the electronic music scene grew in Chile, but this was a new tradition defined by connections to European dance music scenes and the aftermath of military rule, rather than a continuation of a tradition begun by Amenábar, Asuar, and others in the 1950s.[50]

In the twentieth century, technology became an important thread in the sonic tapestry of musical culture. The function and meaning of technology is never straightforward, but examining technology in specific social and historical contexts reveals how technologies afford new musical possibilities and contribute to the formation of knowledge cultures. At the same time, considering the social construction of technology helps uncover how technological *artefacts* and developments are shaped by social forces like gender norms, race relations, and political policy. By drawing upon historical musicology and science and technology studies, these case studies demonstrate the complex and multifaceted role that technology plays in the web of cultural signification.

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[49] Ibid., 421.

[50] Ibid., 431; Alejandro Albornoz, "Música y Tecnología En Chile: Reflexiones Sobre Su Desarrollo e Implicancias Culturales," in *Instalando: Arte & Cultura Digital*, ed. Ignacio Nieto, Italo Tello, and Ricardo Vega (Santiago: LOM Ediciones, 2007), 32.

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