From microsound to vaporwave: Internet-mediated musics, online methods, and genre[1]

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Abstract

How is the internet transforming musical practices? In this article, through a study of five prominent popular and crossover music genres spanning the period from the late 1990s to the present, we examine how the internet has augmented the creative, aesthetic, communicative and social dimensions of music. Analysing the internet-based practices associated with these genres poses methodological and theoretical challenges. It requires new research tools attentive to the online practices involved in their creation and reception. To this end we adapt the Issue Crawler software, an established digital method that analyses networks of hyperlinking on the world-wide web. In addition, it requires a theoretical framework that can respond to music's profuse mediations in the digital environment. We propose that a version of genre theory offers such a framework. The paper concludes by reflecting on the implications of our analysis for theorising music and place and for historical periodization after the internet.

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Over the past twenty years, growing use of the internet has fostered a range of escalating transformations that radically alter the environment for the creation and consumption of music. A number of developments have received critical attention, among them: the changing nature of the musical object;[2] the effects of new modes of internet-based distribution, circulation and disintermediation on the music industries;[3] the novel possibilities for internet-based musical performance;[4] and the potential for music recommendation and discovery systems presented by online databases.[5]

While this literature makes substantial contributions, in this article we take a different direction: we address how the internet has augmented the aesthetic, communicative and social dimensions of particular types of music, exemplifying this with reference to a series of prominent digital music genres spanning the period from the early take-up of the internet in the mid to late 1990s to the present day. We focus on five genres: microsound, an influential genre that arose in the 1990s which articulates strong links to certain areas of avant-garde twentieth-century composition; hauntology, a mid-2000s genre that draws influence from 'pop experimentalism' in 1960s and 70s British culture, notably the music stemming from the BBC Radiophonic Workshop; hypnagogic pop, a lo-fi genre concerned with the ironic transvaluation of 'trash' American genres like new age and meditation music; chillwave, a mainstream American indie genre that rehabilitates 1980s sounds and production styles; and vaporwave, a recent net-based genre that takes digital life and the convergence of media technologies as its subject matter. All five genres have substantial internet-based manifestations that are central to their communicative practices, the social formations they assemble and, in two cases, their aesthetic dimensions. These manifestations are the result of the growth of novel creative, discursive, circulatory and reception practices that strongly influence how musicians, critics and audiences experience and foster relationships with the genres.

The diversity of ways in which key actors associated with these genres employ the internet poses, we suggest, both methodological and theoretical challenges. Methodologically, it requires new tools and approaches attentive to the online practices that have become so prominent in the creation and reception of these genres—methods that can analyse their mediation by the internet. To this end we adapt the Issue Crawler (IC) software, a tool for analysing and visualising networks[6] of hyperlinking on the world-wide web originally developed by Richard Rogers for mapping issue-based controversies

[2] See Jonathan Sterne, *MP3: The Meaning of a Format* (Durham, NC, 2012).

[3] Disintermediation refers to the ways in which the internet has enabled the removal of previous commercial intermediaries in the distribution and sale of music: Andrew Leyshon, *Reformatted: Code, Networks, and the Transformation of the Music Industry* (Oxford, 2014), 37-43. See also Steve Jones, 'Music and the Internet', *Popular Music,* 19, 2 (April 2000), 217–230; Norman Lebrecht, *Maestros, Masterpieces and Madness: The Secret Life and Shameful Death of the Classical Record Industry* (Harmondsworth, 2008); Steve Knopper, *Appetite for Self-Destruction: The Spectacular Crash of the Record Industry in the Digital Age* (New York, 2009); Jeremy Wade Morris, *Selling Digital Music, Formatting Culture* (Oakland, CA, 2015).

[4] See Álvaro Barbosa, 'Displaced Soundscapes: A Survey of Network Systems for Music and Sonic Art Creation', *Leonardo Music Journal*, 13 (2003), 53–59; Pauline Oliveros, Sarah Weaver, Mark Dresser, Jefferson Pitcher, Jonas Braasch and Chris Chafe, 'Telematic Music: Six Perspectives', *Leonardo Music Journal,* 19, 1 (2009), 95–96.

[5] Brian Whitman and Steve Lawrence, 'Inferring Descriptions and Similarity for Music from Community Metadata', *Proceedings of the 2002 International Computer Music Conference* (2002), 591-598; Douglas Eck, Paul Lamere, Thierry Bertin-Mahieux and Stephen Green, 'Automatic Generation of Social Tags for Music Recommendation', in *Advances in Neural Information Processing Systems* (2008), 385-392; Oscar Celma, *Music Recommendation* (Berlin, 2010).

[6] As we discuss later (pages 14-15), our use of the term 'network' is not intended to invoke the theoretical or methodological commitments either of actor-network theory (cf. Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network Theory* (Oxford, 2005)) or of social network analysis (cf. John Scott, *Social Network Analysis, 4th Edition* (London, 2017)). Our use of the term follows standard definitions of network communications technologies. The reification that is the internet (or net) refers to the global system of interconnected networks that carries services like email, peer to peer communication, FTP and the world-wide web (www or web). The web is, then, just one service accessed through the internet—an open source space where documents and other web resources are identified by URLs and interlinked by hypertext links.

online.[7] In Rogers' formulation, IC offers a 'medium-specific' approach to online research for the digital humanities. It aspires to embed itself within the ecology of the internet and 'follow the evolving methods of the medium'.[8] Specifically, IC traces the multilateral exchange of hyperlinks between actors using the web, visualising the results as patterns of interlinkage. This article presents the results of an experiment in which we depart from Rogers' use of IC by applying the method to socio-cultural analysis, in particular to the mapping of music genres online, exploring through this exercise both its powers and limitations. On the basis of our empirical and interpretive work, we propose a set of methodological departures in its uses for the digital humanities going forward.

In addition, the analysis of digital music genres requires a theoretical framework that can respond to music's increasingly profuse mediations in the digital environment. We propose that a version of genre theory as it has been developing in relation to music offers such a framework, one that is itself stretched when confronted with the manifold nature of the internet—for the internet changes what a music genre is in the twenty-first century. A specific enhancement that we make to genre theory is to bring it into conjunction with Georgina Born's theory of music's mediation;[9] and one facet of this framework is the extension, with reference to the reticulate socialities of online music genres, of Born's analysis of music's plural social mediations.[10] Examining the five genres necessitates an expanded theorisation of genre, one that takes internet-based practices, discourses, materialities and socialities into account. A subsidiary aim of this article is therefore to advance genre theory in relation to music.

In what follows we treat as data for analysis the musical and audiovisual practices, professional and amateur music criticism, marketing circuits, social processes and institutional forms that contribute in both their online and hybrid online-offline incarnations to how the five genres are constituted and experienced. Comparing the IC results for the five genres makes apparent how the internet as a technological environment facilitates and intensifies three types of mediation. The net affords, first, the disintermediation of the distribution and sale of diverse *material* forms of recorded music—MP3 files and other digital formats, CDs, cassette tapes, vinyl records—through both legal and, often, extra-legal techniques and platforms. But the net also becomes host to a proliferating array of forms of music's *discursive* and *social* mediation. Indeed in manifold ways, the net multiplies music's discursive and social mediation, engendering new online entities, practices and relations, which may themselves augment, publicise and globalise offline forms—thereby generating the hybrid online-offline forms referred to above.

As the discourses and socialities associated with music migrate and/or expand online, and come to be elaborated in blogs, specialist forums, online publication sites, proprietary social networks and other 'natively digital' spaces,[11] the web comes to act both as a medium through which such practices and relations are enacted in each genre, and as an archive (albeit an unstable one) of those same practices and relations.[12] Specifically, we use IC to analyse and visualise the creation and exchange of hyperlinks among those musicians, bloggers, labels, albums, magazines, record stores, venues,

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[7] See Richard Rogers and Noortje Marres. 'Landscaping Climate Change: A Mapping Technique for Understanding Science and Technology Debates on the World Wide Web', *Public Understanding of Science*, 9, 2 (2000),141–63; and http://govcom.org/scenarios_use.html.

[8] Richard Rogers, *Digital Methods*, (Cambridge, MA, 2013), 15.

[9] See Georgina Born, 'On Musical Mediation: Ontology, Technology and Creativity', *Twentieth-Century Music*, 2, 1 (2005): 7–36; Georgina Born, 'Music: Ontology, Agency and Creativity', in Liana Chua and Mark Elliott (eds.), *Distributed Objects: Meaning and Matter After Alfred Gell* (Oxford, 2013), 130–54.

[10] See Georgina Born, 'Music and the Social', in Martin Clayton, Trevor Herbert, and Richard Middleton (eds.), *The Cultural Study of Music: A Critical Introduction* (London, 2012), 261–74; Georgina Born, 'Music and the Materialization of Identities', *Journal of Material Culture*, 16, 4 (2011), 376–88.

[11] The concept of 'natively digital' came into use in c. 2004 in computer science and digital methods research. It was coined to differentiate those media forms made possible by digitisation and the internet (e.g. tag clouds, ranking algorithms, hyperlinks) from those that have migrated online or been digitised from pre-existing media (e.g. directories, online surveys): see Rogers, *Digital Methods*, 15.

[12] Rogers, *Digital Methods*, 9.

festivals and other actors engaged in co-producing contemporary music genres. The IC results offer, almost too concretely and persuasively, a visualisation that enables us to examine the novel musical, discursive, social and material practices that have emerged in association with the five genres, thereby providing a richer account of the genres themselves. But we also use comparison between the IC results across the five genres to trace the changing nature of the key actors and forms of mediation that appear in the online ecology of each genre. The variety of actors revealed by IC confirms the expanded conception of genre that we shortly advance, clarifying how significant for both the experience and the identity of each genre are the changing mediations in which these actors are enmeshed.

In using the IC software to analyse music genres, the concerns of this article align broadly with research in the incipient field of digital musicology, in which music information retrieval (MIR) and 'machine listening' techniques are used to further musicological analysis. Typically, digital musicologists analyse large amounts of data derived from scores (optical music recognition), sounds (audio analysis), or biographies, concert programmes and other paratextual sources (metadata), employing the results in areas such as genre and stylistic analysis, historiography, reception theory, music theory, performance analysis and more.[13] Closer to our approach, Allington et al combine online social network analysis methods and ethnography to analyse online 'valuing' activities in relation to music.[14] Our use of genre theory allows us to move beyond these approaches in three ways. First, rather than consider the analysis of contemporary musics to be exhausted by the formal analyses of sounds and scores characterising much of this research, we multiply the mediations and types of actors that constitute *what music is* in these and other genres.[15] We contend that music's discursive, material and social mediations contribute to how music, conceived of as an assemblage, is experienced and produces meaning;[16] and aided by IC, we trace how an array of actors participate in producing music genres as, precisely, an assemblage of mediations.

Second, genre theory provides a fruitful lens through which to add important qualitative insights to the quantitative approaches that predominate in digital musicology's computational take on genre analysis.[17] We bring the IC results together with ethnographic and historical analyses of the five genres in order to discriminate between more and less salient findings. Advancing an interdisciplinary framework, we contend that the largely quantitative computational techniques associated with digital musicology should be integrated with qualitative research; only in this way can quantitative findings be made fully legible.

Third, and following on, we insist on the historicity of all the musical and other entities participating in this article: the historicity of the genres at issue, the identities of which can only be understood by tracing their complex temporalities and temporal interrelations; the historicity of the internet, a technological environment subject to relentless and turbulent change in many of its dimensions; and the historicity of our evolving ways of conceptualising and methods of analysing music—in the light

[13] See Richard Lewis, 'Examples of Digital Musicology' (2014), http://www.transforming-musicology.org/resources/documents/examples-of-digital-musicology.pdf for an overview of research in digital musicology. Lewis is affiliated with the Transforming Musicology, a major digital musicology research projected that is funded by the AHRC Digital Transformations in the Arts and Humanities scheme and led by Tim Crawford (2013): http://www.transforming-musicology.org/.
[14] Daniel Allington, Byron Dueck and Anna Jordanous, 'Networks of Value in Electronic Music: SoundCloud, London, and the Importance of Place', *Cultural Trends*, 24, 3 (2015), 211–22.
[15] Georgina Born, 'For a Relational Musicology: Music and Interdisciplinarity, Beyond the Practice Turn', *Journal of the Royal Musical Association*, 135, 2 (2010), 208.
[16] On the concept of a musical assemblage, see Born, 'Music and the Social', 266-268, and the fuller explanation given below.
[17] See, for example, George Tzanetakis and Perry Cook, 'Musical Genre Classification of Audio Signals', *IEEE Transactions on Speech and Audio Processing*, 10, 5 (2002), 293–302; Cory McKay and Ichiro Fujinaga, 'Automatic Genre Classification Using Large High-Level Musical Feature Sets', ISMIR 2004 (2004), 525–530; Peter van Kranenburg, 'On Measuring Musical Style—The Case of Some Disputed Organ Fugues in the J. S. Bach (BWV) Catalogue', *Computing In Musicology*, 15 (2007), 120–137.

of which we call for and attempt a due reflexivity. At a time when both our methods and objects of study—contemporary musics and musical practices—are undergoing rapid change, we aim to initiate fruitful interdisciplinary paths in digital musicology.

Five digital music genres

In selecting the five genres for analysis in this article, we seek to highlight their intrinsic interest as genres, the variety of ways in which the internet figures in their articulation, and the insights gained by analysing their online mediations. In each case we bring out salient features. The roots of microsound lie in the pre-internet era, stemming from innovations in post-War electroacoustic and computer music. Yet its coalescence as a genre was fuelled by the swell of discourse, of online commentary and debate, augured by the creation of the *.microsound* emailing list in 1999. This list provided a means for musicians working outside or on the margins of academic computer music, including those associated with noise, glitch, sound art, ambient and techno, to discuss and explore what was called a new 'post-digital' aesthetic'.[18]

In marked contrast to microsound, the following three genres—hauntology, hypnagogic pop and chillwave—emerged in a context in which the internet had become established. Each of these genres participated in a reaction in the mid-2000s against what was perceived as the modernism of earlier laptop-based music genres of the late-1990s and early 2000s including microsound but also glitch, electronica, IDM and ambient. This reaction took the form of a turn to pre-internet, and in some cases pre-digital, performance, recording and distribution media (the three never entirely separable), along with the construction of a less overtly formalist materialism and more 'narrative' technological imaginaries than those characterising some earlier modernist genres. In developments that have been linked directly to the archiving practices afforded by platforms like YouTube,[19] hauntology, hypnagogic pop and chillwave knowingly re-frame aspects of twentieth and twenty-first century music and cultural history through the subtle redeployment of earlier and outdated musical, sonic and cultural signifiers, as well as the use of obsolete audio media such as cassette tapes, analogue synthesizers and boom boxes—aesthetic gestures aimed at reanimating cultural memory. In hauntology, the temporal period reanimated is that of the 1960s-70s through the use of analogue media such as ¼ inch tape, modular synthesizers and vinyl. Hypnagogic pop and chillwave, in turn, reanimate the 1980s by utilising digital synthesizers, VHS and cassette tape—media and formats that were pervasive in this period. Ostensibly, then, all three genres are defined in part by a turning away from the internet and digital formats as the dominant music media of the twenty-first century. As we will show, however, the web crawl reveals a paradox: for it is in the lively discursive spaces of the internet that the conceptual and aesthetic theories that define hauntology and hypnagogic pop were elaborated, through commentary and debate on underground blogs and publications.

The fifth genre, vaporwave, presents both continuities and contrasts with the three previous genres, its materialist aesthetics engaged more with technological imaginaries of the present and recent past. But vaporwave evidences a radical shift in the culture of internet use: of the five genres, it is the only one in which the net itself becomes central to the creative practices defining the genre, acting as shared horizon of meaning, content medium, production studio and means of distribution. Indeed, vaporwave situates itself entirely within the texture of virtual life. Through ironic remediations of sounds, images and practices characteristic of earlier phases of the internet,[20] the historicity of the net becomes focal for vaporwave aesthetics.

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[18] Kim Cascone, 'The Aesthetics of Failure: "Post-Digital" Tendencies in Contemporary Computer Music', *Computer Music Journal*, 24, 4 (2000), 12–18.
[19] Simon Reynolds, *Retromania: Pop Culture's Addiction to Its Own Past* (London, 2015); Mark Fisher, *Ghosts of My Life: Writings on Depression, Hauntology and Lost Futures* (Winchester, 2014); Adam Harper, 'Comment: Vaporwave and the Pop-Art of the Virtual Plaza', *Dummy* (July 12, 2012): http://www.dummymag.com/features/adam-harper-vaporwave.
[20] Jay David Bolter and Richard Grusin, *Remediation: Understanding New Media* (Cambridge, MA, 1999).

The choice of one genre from the early days of the internet and four more recent genres may seem problematic given the seemingly unbalanced ways in which they relate to one another conceptually and aesthetically. Where microsound appears broadly modernist in its focus on a formally reductive, materialist conception of sound,[21] all four later genres—hauntology, hypnagogic pop, chillwave and vaporwave—have been designated postmodern by commentators because of their evocative and ostentatious qualities of nostalgia, irony and even kitsch.[22] Indeed, in certain ways the latter four 'nostalgia' genres are related: in their common aesthetic focus on simulating auditory experiences of the real or imagined past, and in their overlapping social constituencies[23]—connections that prompt some critics to question whether they should in fact be considered distinct genres.[24]

Yet our justification is twofold. What is instructive about the four later genres is that, despite exhibiting a palpable sonic kinship, to a considerable extent their difference as genres is produced, as the IC findings show, by their *non-sonic* dimensions—by other core mediations characteristic of each genre. In this way the relations between the four genres demonstrate key principles of genre theory: that genre identities are relational and in flux, and that their differentiation is produced not by any one privileged mediation such as musical sound alone, but by the particular constellation of mediations characteristic of any genre. Moreover, comparing the five genres via IC allows us to trace the distinctive contributions made by the internet to each genre, illuminating how each manifests a particular moment in the wider evolving technics and cultures of internet use, as well as how these wider cultures of internet use are in turn mediated by musical practices. In this way we add important insights missing from previous uses of IC and similar online methods: into the internet as an evolving medium, and into its diverse and changing cultures of use.

Retheorising music genre online

We have suggested that the exponential growth of internet-based creative musical practices necessitates a new approach to the theorisation of genre that takes such practices into account. Despite the continuing prominence of genre in recent decades in cultural theory[25] and film theory,[26] the development of genre theory in relation to music has flourished mainly in research on popular musics.[27] In popular music studies, not only musical sounds but music's paratextual, material and

[21] Sonya Hofer, '"Atomic" Music: Navigating Experimental Electronica and Sound Art through Microsound', *Organised Sound*, 19 (2014), 295–303.
[22] Reynolds, *Retromania*, 2015; Fisher, *Ghosts of My Life*, 2014;
[23] The sonic kinship between the four later genres is apparent in these tracks: 'Music is Math' by Boards of Canada, from the *Geogaddi* album, often taken to anticipate hauntology: (https://www.youtube.com/watch?v=F7bKe_Zgk4o&index=2&list=RDmNd2q_QnJc8); 'Laser to Laser' by Onoehtrix Point Never, an exponent of hypnagogic pop, from the *Betrayed in the Octagon* album: (https://www.youtube.com/watch?v=3soucm9emO4&list=RD6ymbt3iTaII&index=3); the chillwave artist Washed Out's 'It All Feels Right', from their *Paracosm* album (https://www.youtube.com/watch?v=qJILRWBKnQ4); and MACINTOSH PLUS' '- リサフランク420 / 現代のコンピュー', from Floral Shoppe, a classic of the vaporwave genre (https://www.youtube.com/watch?v=cU8HrO7XuiE).
[24] Corban Goble, 'R.I.P., Chillwave: The Top 10 Chillwave Artists, and Where They Are Now', *Pitch* (2011); Devon Powers, 'Notes on Hype', *International Journal of Communications*, 6 (2012), 875-873.
[25] See, inter alia, Tzvetan Todorov, *The Fantastic: A Structural Approach to a Literary Genre* (Ithaca, NY, 1975); Tzvetan Todorov and Richard M. Berrong, 'The Origin of Genres', *New Literary History*, 8, 1 (1976), 159–70; Jacques Derrida and Avital Ronell, 'The Law of Genre', *Critical Inquiry*, 7, 1 (1980), 55–81; Mikhail Mikhailovich Bakhtin, *Speech Genres and Other Late Essays*, translated by Vern W. McGee, edited by Caryl Emerson and Michael Holquist (Austin, TX, 1986); John Frow, *Genre* (London, 2005); Franco Moretti, *Graphs, Maps, Trees: Abstract Models for a Literary History* (London, 2005).
[26] See, inter alia, Stephen Neale, *Genre* (London, 1980); Neale, *Genre and Hollywood* London, 2000); Rick Altman, *Genre, the Musical: A Reader* (London, 1981); Neale, 'Questions of Genre', *Screen*, 31, 1 (1990), 45–66; Altman, 'Cinema and genre', in *The Oxford History of World Cinema* (Oxford, 1996), 276-285; Altman, *Film/Genre* London, 1999).
[27] See, inter alia, Franco Fabbri, 'What Kind of Music?', *Popular Music*, 2 (1982), 131–143; Fabbri, 'A Theory of Musical Genres: Two Applications', in David Horn and Philip Tagg (eds.), *Popular Music Perspectives*

institutional forms, its subcultural styles, and the configuration of both the music industry and audiences have been taken to participate in 'genre worlds'[28] and to require theorisation in terms of genre. In this orientation, popular music studies took its lead from cultural, film and literary theory.

Musicology has generally been sceptical towards any claim that the analysis of western art music is enhanced by theories of genre. Important exceptions exist in the writings of Jeffrey Kallberg, Jim Samson and Stefano Castelvecchi, all of whom draw on cultural and literary theories of genre to develop nuanced discussions of the dynamic inner workings of certain genres, with a focus on rhetorical and communicative dimensions (Kallberg), relations between genre, style and form (Samson) and, for the emergent bourgeois operas of the eighteenth century, resonances between narrative content and such wider cultural topoi as sentimentality, as well as social themes in opera (Castelvecchi).[29] Yet in marked contrast to the development of genre theory in popular music studies, these writers avoid any sustained engagement with the 'extra-musical'—and particularly the sociological—aspects of the genres that they address.[30]

Commenting on musicology's eschewal of genre theory, Eric Drott has identified variants of a 'decline-of-genre' thesis in the writings of such figures as Benedetto Croce, Theodor Adorno and Carl Dahlhaus.[31] Drott charts this thesis through a growing conviction in musicology over the twentieth century that with the advance of the principle of aesthetic autonomy, a pervasive individuation ensued, making genre increasingly irrelevant and culminating in the music of the post-War avant-garde. Drott's thrust is to question the decline-of-genre thesis and to rejuvenate genre theory for the analysis of modernist and other contemporary art musics.[32] He does this by contesting the static, nominalist model of genre prevalent in musicology, proposing instead a processual and performative one. While we endorse Drott's argument, in this article his approach to genre remains intra-musical, neglecting to pursue the generative theorisation of the 'extra-musical' characteristic of popular music studies.[33]

(Gothenburg and Exeter, 1982), 52–81; Will Straw, 'Systems of Articulation, Logics of Change: Communities and Scenes in Popular Music', *Cultural Studies*, 5, 3 (1991), 368–88; Straw, 'The Music CD and Its Ends', *Design and Culture*, 1, 1 (2009), 79–91; Simon Frith, *Performing Rites: On the Value of Popular Music* (Cambridge, MA, 1998); Keith Negus, *Music Genres and Corporate Cultures* (London, 1999); Jason Toynbee, *Making Popular Music: Musicians, Creativity and Institutions* (London, 2000); David Brackett, 'Questions of Genre in Black Popular Music', *Black Music Research Journal*, 25, 1/2 (2005), 73–92; Fabian Holt, *Genre in Popular Music* (Chicago, IL, 2007); Charles Kronengold, 'Exchange Theories in Disco, New Wave, and Album-Oriented Rock', *Criticism*, 50, 1 (2008), 43–82; Brackett, *Categorizing Sound: Genre and Twentieth-Century Popular Music* (Oakland, CA, 2016).

[28] Frith, *Performing Rites*, 88.

[29] See Jeffrey Kallberg, 'The Rhetoric of Genre: Chopin's Nocturne in G Minor', *19th Century Music*, 11, 3 (1988), 238-261; Jim Samson, 'Chopin and Genre', *Music Analysis*, 8, 3 (1989), 213-231; Stefano Castelvecchi, *Sentimental Opera: Questions of Genre in the Age of Bourgeois Drama* (Cambridge, 2013).

[30] Thus, for example, while Samson comments that 'genre is a more permeable concept than either style or form, because a social element participates in its definition', an 'element' that he argues should include 'context, function and community validation' as well as social, behavioural and ideological dimensions, adding that 'a genre behaves rather like a contract between… composer and listener' (all Samson, 'Chopin and Genre', 213 and 215), these promising remarks are little developed in the article.

[31] Eric Drott, 'The End(s) of Genre', *Journal of Music Theory*, 57, 1 (2013), 1–45.

[32] A key focus of Drott's application of genre theory is Gérard Grisey's *Les espaces acoustiques* (1974-85).

[33] However, in his earlier book *Music and the Elusive Revolution*, Drott does address the 'association that binds genre and social groups together'. Drawing on the work of Franco Fabbri, Keith Negus (see note 27) and Howard Becker (Becker, *Art Worlds* (Berkeley, CA, 1982)), Drott offers at the outset a model of two-way mediation: 'On the one hand, genres help to forge communities, bringing musicians, fans, critics, and support personnel together around a set of shared musical interests…. On the other hand, these communities… themselves function as a way of distinguishing one genre from another… Genres, in short, both constitute social groups and are constituted by them…. [S]uch identifications mediate musical and political fields'. Overall, despite this opening, the book's contributions are primarily historical rather than to genre theory (all Eric Drott, *Music and the Elusive Revolution: Cultural Politics and Political Culture in France, 1968-1981* (Berkeley, CA, 2011), 7.)

Three dimensions of the current theorisation of genre, for music and other cultural forms, deserve to be highlighted for our purposes. First, as Neale, Fabbri, DiMaggio, Frith, Negus, Brackett, Born and others have shown, music genres are social, discursive and material formations as much as sonic ones.[34] For Neale, genres are 'systems of orientations, expectations and conventions that circulate between industry, text and subject';[35] while Fabbri argues that the emergence of a music genre requires a 'community whose agreement forms the basis for the definition of [the] genre', and that along with formal musical and technical criteria, the conventions governing the existence of music genres may include performance and gestural styles as well as social, spatial, ideological, behavioural, economic and juridical rules.[36] Brackett, in turn, charts how genres are constituted by networks of discourses, institutions and social groups, requiring analysis of the distribution of expressive, material and symbolic resources, the varieties of institutional support, and 'the institutional histories of inclusion and exclusion' characteristic of specific genres.[37]

Born widens the conceptual lens: advocating a move 'from an intra-cultural to a socio-historical semiotics of music',[38] she draws on semiotic, anthropological and genre theories, popular music studies and ethnomusicology to analyse the existence and the significance of meta-generic differences in twentieth-century music between long-term aesthetic formations broadly identifiable as modernist, postmodernist and popular. She argues that these are aesthetic formations the identities of which must be grasped as relational—as constituted by evolving mutual relations of difference.[39] In addition, pointing to music's multiple forms of existence, Born contends that music has no essence but a plural and distributed socio-material being. She proposes that theorising genre, and the nature of musical experience, requires that music be conceptualised as an assemblage of mediations of musical sound of heterogeneous kinds: discursive, corporeal, social, visual, technological, spatial and temporal.[40]

In developing the notion of a musical assemblage Born extrapolates from Deleuze and Guattari and later writers.[41] For Deleuze, an assemblage is a 'multiplicity… made up of many heterogeneous terms', where the assemblage 'establishes liaisons [or] relations between them', and where the 'only

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[34] Neale, *Genre*; Neale, *Genre and Hollywood*; Fabbri, 'A Theory of Musical Genres'; Georgina Born, 'On Modern Music Culture: Shock, Pop and Synthesis', *New Formations*, 2 (1987), 21–78; Georgina Born, 'Understanding Music as Culture: Contributions from Popular Music Studies to a Social Semiotics of Music', in Raffaele Pozzi (ed.), *Tendenze E Metodi Nella Ricerca Musicologica* (Florence, 1993), 211–28; Georgina Born, 'Time, the Social, and the Material: For a Non-Teleological Analysis of Musical Genre', paper presented at the conference 'Music and Genre: New Directions', Schulich School of Music, McGill University, Montréal (September 27-28, 2014); Paul DiMaggio, 'Classification in Art', *American Sociological Review*, 52, 4 (1987), 440–55; Frith, *Performing Rites*; Negus, *Music Genres and Corporate Cultures*; Brackett, 'Questions of Genre', 2005; Brackett, *Categorizing Sound*.

[35] Neale, *Genre*, 19.

[36] Fabbri, 'A Theory of Musical Genres', 2.

[37] Brackett, *Categorizing Sound*, 328.

[38] Born, 'Understanding Music as Culture', 224

[39] This analysis began in early papers ('On Modern Music Culture' (1987); 'Understanding Music as Culture' (1993), 226-28), and culminated in Georgina Born, *Rationalizing Culture: IRCAM, Boulez, and the Institutionalization of the Musical Avant-Garde* (Berkeley, CA, 1995). This ethnography of the Parisian computer music institute, IRCAM, develops a relational account of the evolving historical identities of modernism and postmodernism in music in terms of their differences both from each other and from popular musics writ large, where each is analysed as a long-term cultural system (31–35) or, in the Foucauldian sense, as a discursive formation (14). Chapter 2 develops a historical analysis of this relational kind; Chapters 10 and 11 bring the historical analysis up to the mid 1980s with reference to key elements of the ethnography. The relational analysis of both kinship and differences, at once sociological and aesthetic, amounts to the identification of three meta-genres.

[40] Born, 'Understanding Music as Culture'; Born, 'On Musical Mediation'; Born, 'Music and the Materialization of Identities'; Born, 'Music and the Social', 267-68.

[41] The first enunciation of assemblage theory is in Gilles Deleuze and Félix Guattari, *Mille Plateaux: Capitalisme et Schizophrénie* (Paris, 1980), trans. Brian Massumi as *A Thousand Plateaus: Capitalism and Schizophrenia* (Minneapolis, 1987).

unity is that of a co-functioning'.[42] Manuel DeLanda extends this proposition, suggesting that an assemblage is characterised by 'relations of exteriority' in that any component can be 'detached from it and plugged into a different assemblage', in which case the interrelations between components, and their effect, will be different. In this strongly anti-organicist conceptual scheme, each component has 'a certain autonomy',[43] such that the interactions between them are nonlinear, 'only contingently obligatory'.[44] Moreover, 'relations of exteriority… imply that the properties of component parts can never explain the relations which constitute a whole, that is, "relations [within an assemblage] do not have as their causes the properties of the [component parts] between which they are established"'.[45] Pursuing the nonlinear interrelations that constitute an assemblage, DeLanda likens them to catalysis––to the emergent, part-whole causality that 'deeply violates linearity since it implies that different causes can lead to one and the same effect… and that one and the same cause may produce very different effects'.[46] Although Deleuze and DeLanda do not generally use the term, the components of an assemblage might equally be conceptualised as mediations—since it is through processes of mediation that relations transform or modify the properties of their component parts. In Bruno Latour's rendering, a mediator 'creates what it translates as well as the entities between which it plays the mediating role';[47] indeed, mediators 'transform, translate, distort, and modify the meaning or the elements they are supposed to carry'.[48] Mediation is, then, 'a turn towards what emerges,… what cannot be reduced to an interaction of causal objects and intentional persons'.[49] In Born's extrapolation of assemblage theory to music, the components are given less priority than the relations between them—in the guise of their mutual mediation. The musical assemblage becomes an aggregate of mediations—of discourses, embodied experiences, social relations, visual representations, technologies, physical and virtual sites and other processes and entities that 'carry' while transforming, translating and modifying musical sound, thereby participating in musical experience. It is this framing that we bring to the analysis of the five genres in this article, and to the interpretation of the IC results. We are interested in the striking diversity and singularity of both the actors and the types of mediation revealed across the five genres, and the contributions made by each to the genre's evolving identity, conceived as an assemblage. Moreover, it will become obvious that each genre-based Issue Crawl has a distinctive 'gestalt', an overall 'look', which is itself interpretable.

Second, and following on, by adopting a non-essentialist approach to genre as an assemblage of heterogeneous actors and mediations, it is clear that any such 'component' might also participate in other genres. With this formulation we intend to foreground the untidy, overlapping qualities of genre—often a source of disquiet in discussions of electronic music aesthetics.[50] But rather than such 'promiscuity'[51] undermining genre theory, the existence of nonlinear, non-exclusive relations between actors and mediations makes this into an inescapable condition of genre. Indeed, it both exemplifies and transposes Derrida's 'law of genre': '[A] text cannot belong to no genre, it cannot be without or less a genre. Every text participates in one or several genres,... yet such participation never amounts to belonging'.[52]

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[42] Gilles Deleuze and Claire Parnet, *Dialogues* (London, 1987), 69.
[43] Manuel DeLanda, *A New Philosophy of Society: Assemblage Theory and Social Complexity* (London, 2006), 10 and 11.
[44] Ibid., 12.
[45] Ibid., 11, quoting Gilles Deleuze, *Empiricism and Subjectivity* (New York, 1991), 98.
[46] Ibid., 20.
[47] Bruno Latour, *We Have Never been Modern* (Cambridge, MA, 1993), 78.
[48] Bruno Latour, *Reassembling the* Social, 39.
[49] Emilie Gomart and Antoine Hennion, 'A Sociology of Attachment: Music Amateurs, Drug Users', in John Law and John Hassard (eds.), *Actor-Network Theory and After* (Oxford, 1999), 226.
[50] See for instance Joanna Demers, *Listening Through the Noise : The Aesthetics of Experimental Electronic Music* (Oxford, 2010); Leigh Landy, 'Electroacoustic Music Studies and Accepted Terminology: You Can't Have One Without the Other', in *EMS: Electroacoustic Music Studies Network—Terminology and Translation*. (Beijing, 2006): http://www.ems-network.org/IMG/EMS06-LLandy.pdf.
[51] Christopher Haworth, '"All the Musics Which Computers Make Possible": Questions of Genre at the Prix Ars Electronica', *Organised Sound*, 21 (2016),15–29.
[52] Derrida, 'The Law of Genre', 61.

Third, we take as read the fluxious, temporal nature of genres as evolving constellations with no fixed pattern of development.[53] Music's mediation is, immanently, a process of transformation: the assemblage of sounds, discourses, social relations, technologies, sites (and so on) that together constitute any music genre is not static but dynamic.[54] In this vein, the anthropologist Karin Barber emphasises that the temporal dynamics constitutive of any genre must be conceived of sociologically and in relation to 'textual fields': 'Texts… can be thought of as emerging from and dissolving back into fields of textuality…. Texts and textual materials are circulated, recycled, assembled, expanded or otherwise employed in the construction of new texts. They may be taken up and repeated, or overlooked and forgotten'.[55] To understand the 'disappearances and reappearances' characteristic of genres-in-formation, she argues, is to attend to how genres 'are embedded in and detached from the hierarchical forms of social life, how they are shaped by—and shape—the disposition of communal power and social differentiation, how genre distinctions are maintained [and] canons formed'.[56]

We add to these principles of current genre theory Born's identification, with reference again to Deleuzian assemblage theory, of the plural ways in which music mediates social processes, its 'ability to articulate together four interlocking planes of sociality'.[57] Her account of the four planes of social mediation of music encompasses (first plane) the co-present, real time socialities animated among and between musicians and audiences in situations of creative practice, musical rehearsal and performance; (second plane) the musically-imagined communities,[58] or virtual, affective publics,[59] orchestrated by a common passion for particular musics; (third plane) how music refracts wider social identity formations, whether of class, gender, sexuality, race, ethnicity, nationality or locality; and (fourth plane) how music mediates and is mediated by the institutional and organisational forms through which it is produced and circulated.[60] All four planes enter into the musical assemblage; each has a certain autonomy, and each can be the locus of either reproduction or transformation. Yet they also intersect and may be mutually catalysing. It is through the complex articulations between the four planes that music engenders at once aesthetic and social experience.

Earlier, we noted how the internet encourages and expands the material, discursive and social mediation of music. To pursue discursive mediation: the web is used incessantly in many contemporary music genres to cultivate, publicise and disseminate both knowledge and criticism of music, as well as to facilitate discussion—its 'agora' functions.[61] If music has always been the object of discourse,[62] a core finding of this study is how the web as a medium stimulates an intensification, expansion and democratisation of this discursivity—whether the discourse is aesthetic, critical, political, commercial or playful— inciting participation, and speeding up its production and

[53] Born, 'Time, the Social, and the Material'.
[54] Born, 'On Musical Mediation'; David Brackett, 'Popular Music Genres: Aesthetics, Commerce and Identity', in Andy Bennett and Steve Waksman (eds.), *The Sage Handbook of Popular Music* (Thousand Oaks, CA, 2015).
[55] Karin Barber, *The Anthropology of Texts, Persons and Publics: Oral and Written Culture in Africa and Beyond* (Cambridge, 2007), 218.
[56] Ibid., 224.
[57] Brackett, *Categorizing Sound*, 15.
[58] The concept of musically-imagined community is derived from Benedict Anderson, *Imagined Communities: Reflections on the Origin and Spread of Nationalism* (London, 1983).
[59] See Michael Warner, *Publics and Counterpublics* (Cambridge, MA, 2005); and Georgina Born, 'Introduction: Music, Sound and Space—Transformations of Public and Private Experience', in Born (ed.), *Music, Sound and Space—Transformations of Public and Private Experience* (Cambridge, 2013), especially 35-40, 'On musical and sonic publics'.
[60] For a fuller exposition of the four planes of social mediation, see Born, 'Music and the Materialization of Identities', 376-88; Born, 'Music and the Social'.
[61] Niklas Damiris and Helga Wild, 'The Internet: A New Agora?', in Jacques Berleur and Diane Whitehouse (eds.), *An Ethical Global Information Society* (New York, NY, 1997), 307–17.
[62] Jean-Jacques Nattiez, *Music and Discourse: Toward a Semiology of Music* (Princeton, NJ, 1990); Lawrence Kramer, 'Subjectivity Rampant! Music, Hermeneutics, and History', in Martin Clayton, Trevor Herbert and Richard Middleton (eds.), *The Cultural Study of Music : A Critical Introduction* (London, 2003), 124–135.

circulation. All of the genres except chillwave exhibit this discursivity in the guise of a pronounced theoreticism[63] attached to the music by prominent critics—a theoreticism that indexes these critics' efforts to attain underground and/or art status for these musics.

The internet has equally significant implications for music's social mediation. On the one hand it engenders online extensions of entities with an offline social existence—labels, venues, festivals, performance events, funding bodies and so on. On the other hand, it fosters 'natively digital' social forms—most obviously, the multiple 'social worlds' engendered and regulated by social networking sites, some of them entangled with, and parasitic on, users' cathexis to the musically-imagined communities that coalesce around particular music genres.

Two less obvious facets of music's social mediation seem particularly remarkable in our material. The first concerns the ways in which mundane online formats like listservs, bulletin boards, blogs and other fora devoted to music-related issues *combine* discursive and social mediation—for their participatory discursivity and creativity both depend upon and generate socialities and social imaginaries.[64] We show in relation to microsound and vaporwave how these participatory platforms hybridise Born's second and first planes: in coalescing around shared musical passions, they constitute particularly strong versions of musically-imagined community; at the same time, they engender near-real time, distributed and participatory forms of musical creativity—analogous to the co-present socialities of musical practice and performance. Moreover, such genre-enacting online fora can also morph into incipient organisational forms—fourth plane entities—through which music and other music-related mediations are produced and circulated.[65]

A second facet of social mediation evident in the patterns of hyperlinking visualised by IC concerns the social relations apparently concretised by these hyperlinks. Where previous uses of IC depict hyperlink relations as uniform elements forming a networked ecology, we show that it is imperative to probe their differences. In diverse ways, the hyperlinking that we trace indicates how the actors in each genre are engaged in the bilateral exchange of resources, commonly through a mutual valorisation that may be symbolic and/or material—via the mutual attribution and accumulation of symbolic, cultural and/or economic capital. Indeed, the ease with which actors can participate in hyperlinking suggests that the web assists in accelerating this ecology of mutuality in which two or more parties co-consecrate each other, and all are winners.[66] In this sense, the internet's capacity to both speed up and intensify the exchange of hyperlinks amounts to an online version of what Born has identified as an inflationary cycle of charisma, prestige and legitimation characteristic of musical and artistic fields, in which actors—musicians and artists, intermediaries (critics, managers, agents etc), and institutions (labels, galleries, concert organisations, festivals, publishers etc)—benefit from a spiral of mutual endorsement and valorisation.[67]

However a striking finding of our research is that the ease of hyperlinking also engenders uses that are *not* bilateral. Rather, holding the IC results up against ethnographic data points to what might be called aspirational hyperlinking:[68] the anticipatory projection by one party of wished-for relations with and

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[63] Born, *Rationalizing Culture,* 1995, 42.

[64] See, by analogy, Baym's analysis of the co-development of online friendship groups and individual identities in Usenet, an early computer network for discussion and file sharing: Nancy K. Baym, *Tune In, Log On: Soaps, Fandom, and Online Community* (Thousand Oaks, CA, 1999).

[65] On such incipient organisational forms, and how the four planes of social mediation manifest in online music consumption platforms, see Blake Durham, *Regulating Dissemination: A Comparative Digital Ethnography of Licensed and Unlicensed Spheres of Music Circulation*. DPhil thesis, University of Oxford (forthcoming 2017).

[66] Bourdieu, Pierre. *The Field of Cultural Production: Essays on Art and Literature*. Columbia University Press, 1993, 76–77.

[67] Born, *Rationalizing Culture,* 91–94.

[68] In general, the analysis of different hyperlinking styles remains undeveloped in the work of Rogers and collaborators. Rogers and Marres (2000, 9–12) identify two 'styles' of hyperlinking among organisations engaged in the climate change debate: 'cross-linkers', or reciprocal linking, and non-cross-linkers or non-reciprocal linking. They relate non-cross-linking to a 'neo-pluralist gap' (46). Rogers develops this further in a

valorisation by another—relations that are not (yet) reciprocated or actualised, but in which the potential for an inflationary cycle is sought.[69] We will see that this is particularly characteristic of musicians and labels from those genres aspiring to 'cross over' from pop to art, who seek to accrue new kinds of symbolic and cultural capital by creating associations with established musical and cultural institutions.

If the social relations immanent in this aspirational hyperlinking have a temporal orientation—projecting future relations that do not yet (and may never) exist—then time enters centrally into other aspects of actors' online co-creation of genres. For IC shows also how distinctive kinds of hyperlinks-as-relations temporalise the genre network differently: actors—whether musicians, critics or labels—may be engaged in consolidating or extending a network that is becoming established; or they may be coining and naming what is as yet an incipient genre, riding the crest of the genre's emergence. Particularly of note is how, in the fluxious period of a genre's emergence, through the combined discursive and social mediation animated by influential critics through their blogs and writings—their ability, by interpreting the situation, to accrue followers, generate musically-imagined community, and thereby augment the audience—such critics crystallise what has not yet crystallised, accelerating a genre's coalescence. Of course, the temporality can also work the other way, as in the retrospective, teleological hailing by influential critics or labels of genres that are taken to have always already been there—but unrecognised.

It is, then, this lineage of non-essentialist, non-formalist, temporalised and non-teleological genre theory as it has developed particularly in popular music studies, itself influenced by cultural and anthropological theory, that we advocate in this article. We extend this approach, however, to consider how the internet's role in contemporary genres complicates the analysis of music's mediation, posing new conceptual and methodological demands.

The Issue Crawler software as method

The Issue Crawler software is well established in digital sociology,[70] and the method is quite simple: one starts with a curated list of URLs representing between 10 and 20 key actors associated with whatever field one wants to analyse. For our purposes, analysing music genres online, these starting links might be a list of representative actors from a particular genre website (musicians, record labels, stores, magazines, festivals and so on), a prominent critic's overview article about a particular genre or scene, or another authoritative source of knowledge about a genre.[71] IC then crawls through the web

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later paper (2010) with reference to non-reciprocal 'aspirational linking', in which smaller organisations link to established ones in order to attempt to secure affiliation or funding—but he takes the interpretation no further. While this is close to our concept, we developed it independently and we extend the analysis below. See Rogers, and Marres, 'Landscaping Climate Change'; and Richard Rogers, 'Mapping Public Web Space with the Issuecrawler', in Bernard Reber and Claire Brossaud (eds.), *Digital Cognitive Technologies: Epistemology and the Knowledge Economy* (London, 2010), 89–99.

[69] The distinction we make here between reciprocal hyperlinks that in some way actualise a mutuality in social relations and aspirational hyperlinks that, by projecting relations with another entity, attempt thereby to bring them into being, but in which there is no certainty that this will be achieved, is an important rejoinder to notions of performativity which assume that by performing or enacting social relations they come into being. See John Law, *After Method: Mess in Social Science Research* (Abingdon, 2004), 56; Latour, *Reassembling the Social*, 34–35.

[70] Rogers and Marres, 'Landscaping Climate Change'; Axel Bruns, 'Methodologies for Mapping the Political Blogosphere: An Exploration Using the IssueCrawler Research Tool', *First Monday*, 12, 5 (2007): http://firstmonday.org/ojs/index.php/fm/article/view/1834; Rogers, 'Mapping Public Web Space with the Issuecrawler'; Noortje Marres, 'Why Map Issues? On Controversy Analysis as a Digital Method', *Science, Technology & Human Values*, 40, 5 (2015), 655–86.

[71] For our web crawls with IC we used URL lists authored by acknowledged authorities: for microsound, the *.microsound* links page; for chillwave, a 2011 pitchforkmedia.com article about the genre; and for the remaining three genres we derived URL lists from influential articles by prominent critics—for hauntology, Simon Reynolds, 'Mike Powell, Evocative and Thought-Provocative, on Ghostbox and Ariel Pink', *Blissblog* (2006): http://blissout.blogspot.co.uk/2006/01/mike-powell-evocative-and-thought.html; for hypnagogic pop, David

pages associated with these starting URLs and stores in a database any hyperlinks that direct the user to another destination on the web (Figure 1a). For higher 'crawl depth' settings IC does this again, analysing the outlinks from the first set of results (crawl depth 1), and adding a second set (crawl depth 2), and so on (Figure 1b). It analyses all these 'outlinks', discarding any that appear less than twice and retaining the rest; these are deemed 'significant' actors in the field (or genre) being analysed.[72] (Note that the same conditions apply to the web pages of the starting links: in order to appear in the results, they too have to receive two or more inlinks.) The results of this 'co-link analysis' are then plotted in a 2D visualisation or map that displays the inlink and outlink patterns as a network among key web pages—termed either actors or nodes—with the lines between nodes illustrating the direction of the hyperlink. The relative x-y position of the nodes on the map indicates their degree of 'relatedness', i.e. how frequently links are exchanged between them (Figure 2); while the relative darkness of the nodes corresponds to the number of inlinks the associated site receives.[73]

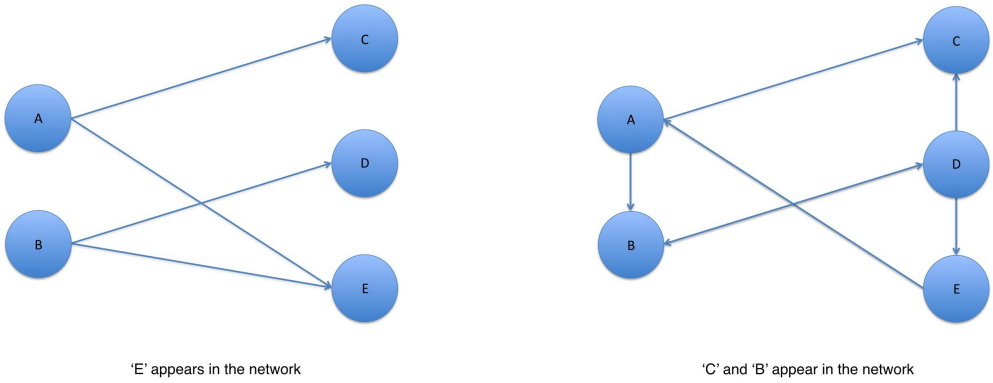


Figure 1a: Visualisation of co-link analysis with a crawl depth of one.
Figure 1b: Crawl depth of two: *A* and *B* are starting links; *C, D,* and *E* are the sites they link to

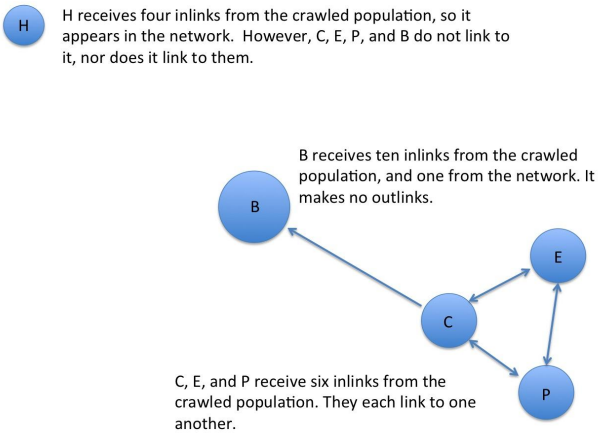


Figure 2: Visualisation of network results

Keenan, 'Childhood's End', *The Wire*, 306 (2009), 26–31; and for vaporwave, Adam Harper, 'Comment: Vaporwave and the Pop-Art of the Virtual Plaza'.

[72] In practice, however, a greater number of inlinks than two are often specified as the 'cut off' for inclusion in the network—otherwise the resulting network is too dense.

[73] Darker nodes indicate more inlinks, lighter nodes indicate fewer inlinks. To produce our visualisations, the results generated using IC were further manipulated in Gephi, an open source software tool for graph and network visualisation: see www.gephi.org.

Richard Rogers developed Issue Crawler in association with govcom.org, 'an Amsterdam-based foundation dedicated to creating and hosting political tools on the Web', with the goal of mapping issue-related scientific or technological controversies in the online public sphere.[74] Given a controversy, IC would display who (or whose website) in government, business or civil society was linking to whom, thereby indicating how the debate was being framed by, and the relative positioning of, key actors. Rogers' project is linked to the larger 'Mapping Controversies' (Macospol) research platform led by Bruno Latour,[75] which aims to support participation in technological democracy by providing tools for mapping scientific controversies online. Since its development in the late 1990s, IC has been employed to map a range of controversies online in relation to climate change,[76] food technologies,[77] biofuels,[78] digital activism in the Middle East[79] and the Fukushima disaster.[80]

It might be thought that by tracing 'networks' of hyperlinking, IC amounts to an applied version of Bruno Latour's actor-network theory (ANT). This is an impression fuelled both by IC's connection to Macospol and by the particular ways in which the software traces online connections, in that it is agnostic both about the scale of the online actors it recognises (akin to Latour's 'flat' ontology)[81] and about whether they are human or nonhuman—two of ANT's defining predicates. Moreover, the use of 'actor' and 'network' when interpreting the IC visualisations might appear to be a direct transposition of ANT's core concepts. However, the meaning of the terms in IC is quite different from ANT.[82] Indeed, in 1999 Latour signalled his opposition to any elision between ANT's use of the term network, which conveyed a 'series of transformations—translations, transductions', and how the term is used in relation to the web, as 'transport without deformation… exactly the opposite of what we meant'.[83] Yet in recent writings, Latour's position has changed: he champions digital tools like IC as a means of fleshing out his conception of the 'social' in the guise of non-totalising groupings achieved by processes of circulation and connection between human and nonhuman 'monads'.[84] While we cannot develop this point, Latour's privileging of a monadic sociology in his recent work, and the fit he has

[74] See http://www.govcom.org/about_us.html.
[75] See http://www.mappingcontroversies.net/: 'Macospol' stands for Mapping Controversies in Science and Technology for Politics.
[76] Kathleen McNutt, 'Policy Actors on the Web: The Canadian Climate Change Virtual Policy Network', *Canadian Political Science Review*, 1, 3 (2008), 1-15; Tommaso Venturini and Daniele Guido, 'Once Upon a Text: An ANT Tale in Text Analysis', *Sociologica*, 6, 3 (2012), 1-16; Marres and Rogers, 'Landscaping Climate Change'; Sabine Niederer, '"Global Warming Is Not a Crisis!": Studying Climate Change Skepticism on the Web', *NECSUS: European Journal of Media Studies,* 2, 1 (2013), 83–112.
[77] Gerald Beck and Cordula Kropp, 'Infrastructures of Risk: A Mapping Approach towards Controversies on Risks', *Journal of Risk Research*, 1, 14 (2011), 1–16.
[78] Jenny Eklöf and Astrid Mager, 'Technoscientific Promotion and Biofuel Policy: How the Press and Search Engines Stage the Biofuel Controversy', *Media, Culture and Society*, 35, 4 (2013), 454–71.
[79] Fieke Jansen, 'Digital Activism in the Middle East: Mapping Issue Networks in Egypt, Iran, Syria and Tunisia', *Knowledge Management for Development Journal*, 6, 1 (2010), 37–52.
[80] Jean-Christophe Plantin, '"The Map Is the Debate": Radiation Webmapping and Public Involvement during the Fukushima Issue' (2011), *SSRN Electronic Journal* (September 2011), 1-16; David Moats, *Decentring Devices: Developing Quali-Quantitative Techniques for Studying Controversies with Online Platforms*. PhD thesis, Goldsmiths College, London (2015), 1-270.
[81] Bruno Latour, 'On Recalling ANT', *The Sociological Review,* 47, S1 (1999), 15–25, 18; Latour, *Reassembling the Social.*
[82] Indeed, from a formal perspective, Issue Crawler can be seen as a form of social network analysis (SNA). In SNA, social data of various kinds are collected and then plotted on to network graphs so that the structure of the nodes and their relations can be analysed. The visualization of networks of social relations is taken to make possible 'an examination of their structural properties and their implications for social action' (Scott, *Social Network Analysis*, 2), so that networks gain an ontological status. IC departs from SNA both in the exclusive use of the web as a source of data and in the situated nature of its claims, given that it does not aspire to any universal social ontology. Rather, IC is a tool intended to capture and highlight the partiality of hyperlinking practices and to enable their interpretation.
[83] Latour, 'On Recalling ANT', 15.
[84] Bruno Latour, Pablo Jensen, Tommaso Venturini, Sébastian Grauwin and Dominique Boullier, '"The Whole Is Always Smaller than Its Parts"– a Digital Test of Gabriel Tarde's Monads', *British Journal of Sociology*, 63, 4 (2012), 590–615.

latterly discovered between it and digital methods, is at odds with the approach to music's social mediation advocated in this article, in which we extend to the internet Born's theorisation of mutually intersecting planes of social relations activated and refracted by music.

In this study, we revise how IC is employed: most obviously, the focus shifts from analysing issue-based controversies online, with their discursive orientation, to music genres, which necessarily entails the multiple mediations alluded to earlier, as well as matters of aesthetics. The question of which actors are made visible by IC and which omitted influenced both our original choice of the genres and our analysis of the IC results. Informed by the developments in genre and mediation theory described, the results can be conceived of as visualising patterns of relations between online actors, actors that in some cases exist purely as online entities and in others are online entities (websites, platforms) that are both extensions and representations of diverse offline entities (labels, festivals, galleries, funding bodies and so on)—those hybrid online-offline actors that we referred to before.

What, then, is productive about using IC beyond the identification of a sample of actors with online presences associated with a genre, and their hyperlink relations? And how can these findings be further interpreted? Our contention is that bringing this material together with ethnographic and historical insights allows us to extrapolate from the appearance of key actors and their hyperlinking so as to analyse both the practices—the types of creativity, discursivity, sociality and materiality—in which these actors participate, and thereby the mediations in which they are engaged. It also enables us to probe closely the *nature* of the relations otherwise assumed by co-link analysis. In the sections that follow, for each genre we offer, first, an account of its nature and genesis, second, an account of its distinctive uses of the internet, and third, an analysis of the IC results and how they illuminate certain core actors, practices and mediations characteristic of the genre.

Qualifications immediately have to be made. First, IC does not provide an exhaustive representation of any genre. Indeed, due to the nature of hyperlink analysis, only a subset of the actors associated with a genre appears in the resulting visualisations. Actors like artists, critics, bloggers and labels are often prominent, whereas other core entities associated with a genre but not ordinarily represented online—musical scores, performance events, musical instruments—do not appear. Moreover, the actors revealed by IC tend to be those involved in music's creation, discursive elaboration, or dissemination, while the dispersed nature of audiences means they are less apparent. Since the formation of audiences is intrinsic to the operations of genre, the omission is significant. At the same time, the web crawls for two genres, microsound and chillwave, reveal a strong online presence of mainstream intermediaries engaged in the constitution of audiences—festivals, galleries, promoters, ticketing agencies and so on. This is a clear indicator of their relatively established nature as genres: occupying in the case of microsound a crossover space between art music, popular music and sound art, and in the case of chillwave, commercial popular music. In contrast, the web crawls for hypnagogic pop and vaporwave show few established intermediaries, but rather networks of entities—tiny labels, Tumblr sites—organised by participants. Evidencing little separation between producers and audiences, the latter genres approach those 'self-sufficient' publics characteristic of the avant-garde that Pierre Bourdieu identified as 'producers who produce for other producers'.[85]

Second, the IC results are an artifice of the algorithm deployed. Notably, not all hyperlinks that appear as a result of the crawl are significant; some are mere by-products of running the algorithm, amounting to redundant findings. Furthermore, while it tends to be the case that co-link analysis produces maps of musical kinship, this is not always so: artists more commonly associated with hypnagogic pop appear in the hauntology map, while prominent DJs and remix artists appear across the IC maps irrespective of genre identity. On the one hand, this is a byproduct of analysing hyperlink relations rather than stylistic ones. Actors link to one another for all kinds of reasons, and all it takes is for this to happen twice and a musically spurious artist will appear in the genre map. On the other hand, it affirms the promiscuity of genres mentioned earlier: a musician may appear in many networks without compromising the coherence of any assemblage. Again, it is by taking each IC visualisation as

[85] Pierre Bourdieu, *The Field of Cultural Production: Essays on Art and Literature* (New York, 1993), 50-51.

a whole—as visualising an assemblage of sonic, discursive, social and material mediations—that we can extrapolate from these online relations to a genre. All of this reinforces the need to draw on ethnographic and historical data when interpreting the results of IC and similar methods.

Third, IC is restricted to a 'presentist' mode: the algorithm analyses current hyperlinking activity, bracketing temporality and history.[86] Of course, the web is notoriously unstable as an archive and research site. The genealogies of web pages, and of the networks of hyperlinks in which they are enmeshed, are continually undermined by the internet's characteristic cycles of obsolescence and renewal.[87] Moreover, actors whose contributions were made (to a controversy or genre) before the net existed, or who are no longer active but continue to exercise influence, do not appear in the IC results. For music genres that enact strong genealogical ties to the past, as many do, this blindness to temporal depth is a serious restriction. It requires, again, recourse to other sources of historical insight.

A final observation is that previous uses of IC and similar digital methods overlook a critical challenge for internet-based research: not only do internet technologies evolve, but *cultures of internet use* also evolve. Our analysis illuminates how the uses of the net change across the five music genres: from early-adopters' experiments in orchestrating online discussion and debate (microsound), to a contemporary phase involving a reflexive, parodic simulation of earlier cultures of internet use (vaporwave). With this study we therefore advance an understanding of the internet as an unfolding medium, one that stimulates a developing sense of historicity among each generation of users, while also hosting creative practices in which the very identity of the internet as a medium is being reflexively figured out. It is a concern with temporality and history that we aspire to seed in future research by comparing and tracing the relations over time between the five genres.

Despite these qualifications, the IC findings prove to be informative, and they counterbalance the formalist orientation of previous, MIR-based digital musicological methods. The IC software is a powerful means to explore the online manifestations and online-offline relations and dynamics of music genres in which the internet plays a decisive role. Yet by drawing attention to IC's limitations, we underscore the benefits of mixed methods when analysing its results. Drawing on ethnographic and historical research is, we suggest, productive in general for acute uses of online research tools, and specifically for analysing the genres that we address in the sections that follow.[88]

Microsound: 'Formalized music' to genre

Although we claim that microsound is a genre, this is contentious. In the academic disciplines of electroacoustic and computer music, the term microsound has more often been identified with a philosophy, technique or style. Iannis Xenakis coined the term ('micro sons') in his seminal text *Formalised Music*, conceiving of it as a compositional philosophy for modelling sound at microtemporal scales and a set of embryonic techniques ('microsound synthesis research') to achieve this.[89] Curtis Roads' 2000 book *Microsound* followed Xenakis in its focus on philosophy and technique, adding a historical-musicological component by articulating a stylistic tendency towards microsound in the music of Stockhausen, Gottfried M. Koenig, Horacio Vaggione and other late twentieth-century composers.[90] In parallel, nonacademic forms of microsound developed from the mid 1990s in the work of self-taught musicians linked to independent labels associated with experimental electronic dance musics such as 12K, Line and Mille Plateaux; but here too any notion of genre is

[86] Noortje Marres and Esther Weltevrede, 'Scraping the Social?', *Journal of Cultural Economy*, 6, 3 (2013), 313–35; Rogers, *Digital Methods*.
[87] Rogers, *Digital Methods*, 24.
[88] For a similar argument about the benefits of combining quantitative and qualitative research methods, but within the framework of social network analysis, see Nick Crossley, 'The Social World of the Network: Combining Qualitative and Quantitative Elements in Social Network Analysis', *Sociologica*, 1 (2010): 1-34.
[89] The elaboration of microsound synthesis research occurred in the revised 1971 edition published by Indiana University Press; in the original 1963 edition published by Editions Richard-Masse, 'microsound' ('micro sons') appeared, but only as a formal descriptor.
[90] Curtis Roads, *Microsound* (Cambridge, MA, 2001).

eschewed. Kim Cascone, a central figure in the nonacademic scene, maintains that microsound's 'proliferation has developed without regard for stylistic boundary',[91] while the musicologist Joanna Demers argues that microsound spans genre categories.[92] Formally, microsound can be considered a type of timbre- or 'noise'-based composition: it involves composition of (often noisy) timbres, using sound synthesis and signal processing techniques, as well as composition with timbre, rather than primarily through the manipulation of melody, harmony or rhythm.[93]

Our case, however, is that following the creation in 1999 of the *.microsound* email list, microsound coalesced as a legible genre.[94] One of seven dedicated genre mailing lists hosted by the influential hyperreal.org, an online organisation for experimental forms of culture with roots in the early 1990s San Francisco rave scene, the *.microsound* list enabled musicians from an array of scenes external to academic electroacoustic music—including techno, ambient, sound art, glitch and noise—to develop a new aesthetic that was defined, ambiguously, as both 'digital' and 'post-digital'. A particular remit of the list was to discuss the new aesthetic forms and practices offered 'by the proliferation and widespread adoption of digital signal processing (DSP) tools'.[95] Such DSP tools had originally been developed in research institutions; but the rise of affordable consumer music technologies in the 1990s led to their commercial development and availability outside the realm of academic electroacoustic music. A classic example is the GRM Tools suite: developed at the GRM (Groupe de Recherches Musicales), an influential Parisian music research centre, the package included tools for spectral transformation (FFT), granular synthesis, spatialisation, equalisation and more. Given their circulation online as 'warez' (pirated software) on peer2peer networks and filesharing websites, such tools achieved a certain ubiquity in the 1990s; indeed, they were so pervasive that some practitioners and commentators came to see them as generic, the sounds produced by the tools having become too familiar or over-exposed.[96]

In these conditions, microsound came to be associated with a particular family of techniques known as 'granular' and 'particle' synthesis, as well as 'nonstandard synthesis', 'distortion synthesis', 'spectral synthesis', and other types of 'sampling' synthesis techniques. It is these sound synthesis and processing techniques, newly circulating online—in the guise of research articles, software, patches and code—that were the driving force in the emergence and cultivation of a particular microsound aesthetic. The relation between tools and resulting sound is clearly audible in Kim Cascone's *Pulsar Studies*, made available online in 2000. Derived entirely from Curtis Roads' and Alberto De Campo's PulsarGenerator software, the album is exemplary both of the microsound aesthetic and of its mediation by specialist DSP tools.[97] Key features of the microsound sound were its 'close-up' focus on texture and timbral transformation, a preference for stasis and juxtaposition over 'teleological'

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[91] Kim Cascone, Paulo Mouat and John Saylor, *.microsound Mailing List.* http://microsound.org/ (1999 on).
[92] Demers, *Listening Through the Noise,* 73. Demers distinguishes between academic and independent strains of microsound. In contrast, Haworth argues that the genre's identity has largely been a product of the growing interrelations between academic and nonacademic microsound scenes. See Christopher Haworth, 'Protentions and Retentions of Xenakis and Cage: Nonhuman Actors, Genre, and Time in Microsound', *Contemporary Music Review* (forthcoming).
[93] The distinctive aesthetic of microsound can be heard in the following tracks: https://www.youtube.com/watch?v=GNkS2l1oY20&list=PLiI5mVDXItD_T_cTJDev7n7CV62Wl4Zci&index=8, https://youtu.be/70byQuA58fg, https://www.youtube.com/watch?v=CUR7mFmoQsU
[94] Haworth, "'All the Musics Which Computers Make Possible"', 2016. Importantly, identifying microsound as a genre does not prevent the term's use, also, as a style or technique. Conceiving of genre as an assemblage of heterogeneous components means that the term 'microsound' can operate at multiple scales without contradiction.
[95] Cascone et al. *.microsound*, 1999. In this context, DSP means the processing of digital audio signals using algorithms.
[96] This generic attribution was negatively weighted, as evidenced in the 1999 Prix Ars Electronica jury's identification of a characteristic and overused 'gorgeous shuttling, tumbling, shingling sound of GRM Shuffler VST mode' in electroacoustic art music. Kodwo Eshun, 'Music From the Bedroom Studios', Ars Electronica Jury Statement (1999): http://90.146.8.18/en/archives/prix_archive/prixjuryStatement.asp?iProjectID=2598.
[97] For more on PulsarGenerator's aesthetic genealogy, see Christopher Haworth, 'Sound Synthesis Procedures as Texts: An Ontological Politics in Electroacoustic and Computer Music', *Computer Music Journal,* 39, 1 (2015).

attributes of form such as development and rotation, and an interest in sounds that exploit the thresholds of human hearing—quiet, barely audible amplitudes, and near-infra- and ultrasonic frequencies. Many of these qualities are direct outcomes of the tools' marked aesthetic affordances, including detailed sculpting of microtemporal variation at the expense of larger-scale temporal shaping. Cascone's deliberate citation of PulsarGenerator in the album's title suggests that the mutual mediation of creative practice and technology in the resulting aesthetic is welcomed, even if the contribution of this symbiosis to constituting a genre is not. The new connections between academic and nonacademic scenes forged by the circulation of these and other software tools also had wider aesthetic effects, fostering new hybridisations of art and popular music subgenres—micromontage and glitch, minimalism and ambient, electroacoustic music and drone.[98]

Microsound's internet-based manifestations were larger than the email list, however. They comprised a cluster of three 'natively digital' architectures—an FTP server and the world wide web in addition to the email list—and each contributed something distinctive to microsound's development as a genre. The email list, as noted, became a discursive forum in which not only synthesis and processing techniques but concepts, aesthetic ideas and genealogies could be circulated and debated. These functions of the email list are not limited to microsound; for compared with their pre-net equivalents––music magazines and fanzines—such lists act more generally as sites in which the discursive definition, elaboration and contestation of genres are played out, generating a vastly expanded and relatively open field of discursivity around music. The FTP server, in turn, provided a means to organise a novel type of geographically-distributed musical collaboration: the microsound .mp3 'projects' page, an interface for time-deferred collective musical praxis that took place both alongside and within the list discussions. Using only a shared sound file as source material, list members were periodically invited to respond creatively to high-concept 'challenges' issued by other users,[99] uploading their compositions to the server, from where they could be downloaded or listened to publicly. The resulting compositions function as an online archive curated to showcase the microsound aesthetic both to participants and to wider publics. For its part, the web was used by the *.microsound* list to provide a curated list of URLs for what were deemed to be representative artists and labels. Juxtaposing currently active artists with historical precursors, and artists with organisations, the list portrays a genealogy that frames and defines microsound as a genre (Figure 3).

[98] Kim Cascone, 'The Aesthetics of Failure: "Post-Digital" Tendencies in Contemporary Computer Music', *Computer Music Journal*, 24, 4 (2000),12–18; Haworth, "'All the Musics Which Computers Make Possible"'.
[99] The 'challenges' took the form of responses to particular theories, literary, film or musical works, and can be compared to the verbal or 'event' scores of Fluxus (see John Lely and James Saunders, *Word Events: Perspectives on Verbal Notation*, London, 2012). For example, one drew inspiration from media theorist Todd Gitlin's (2007) idea that that the average length of time needed to comprehend new information today is seven seconds. In response, members were invited to create miniatures of no longer than seven seconds' duration, following rigid formal constraints. See Todd Gitlin, *Media Unlimited, Revised Edition: How the Torrent of Images and Sounds Overwhelms Our Lives* (New York, 2007).



.microsound related links

this is the list of related artist and labels as it was on the old website. in the next few days we'll have a new updated list with the appropiate links.

artists	artist, cont'd	labels
aube	phoenecia	12k
ramon bauer/general	peter rehberg/pita	ina-grm
magic/rehberg & bauer	/rehberg & bauer	mego
francois bayle	jean-claude risset	microwave
frank bretschneider/komet	curtis roads	mille
herbert brun	snd/shirt trax	plateaux/ritornelle
kim cascone	tom steinle	rastermusic
richard chartier	nobukazu takemura	touch
farmers manual	terre thaemlitz	
fennesz	barry truax	
bernhard gunter	voice crack	
hecker/cd_slopper	trevor wishart	
christoph heeman	iannis xenakis	
ryoji ikeda		
infotron		
tetsu inoue		
zbigniew karkowsi		
monolake/robert henke		
carsten nicolai/noto/produkt		
/signal		
oval		
bernard parmegiani		

Figure 3: The original .microsound.org links page (1999)

In these ways, in addition to discursive mediation, the *.microsound* resources can be seen to generate an array of social mediations manifesting the first, second and fourth of Born's planes. The .mp3 projects page engenders a form of distributed creative practice: an online, time-shifted version of the (first plane) microsocialities of musical practice. The moderated *.microsound* email list assembles a (second plane) musically-imagined community of musicians, fans and listeners who share their enthusiastic engagement with the microsound aesthetic and philosophy. But the *.microsound* list also constitutes an incipient (fourth plane) organisational form—overseen and regulated by moderators Cascone, John Saylor and Paulo Mouat—which coordinates those practices and fora deemed central to the genre's production, circulation and consumption. It was in this expansive online environment that 'microsound' began to circulate as a colloquially understood, albeit fuzzy, genre identifier. Among the mediations that it brought together were the discursive and social mediations described, notably a musically-imagined community engaged via the email list in negotiating the very terms of the genre's definition, as well as a body of critical literature,[100] a set of organological and stylistic regularities derived from the digital materialities of the computer, and a formalist aesthetic focused on the idea of sound as 'material'.[101]

[100] Cascone, 'The Aesthetics of Failure'; Demers, *Listening Through the Noise*.
[101] Hofer, '"Atomic" Music'.

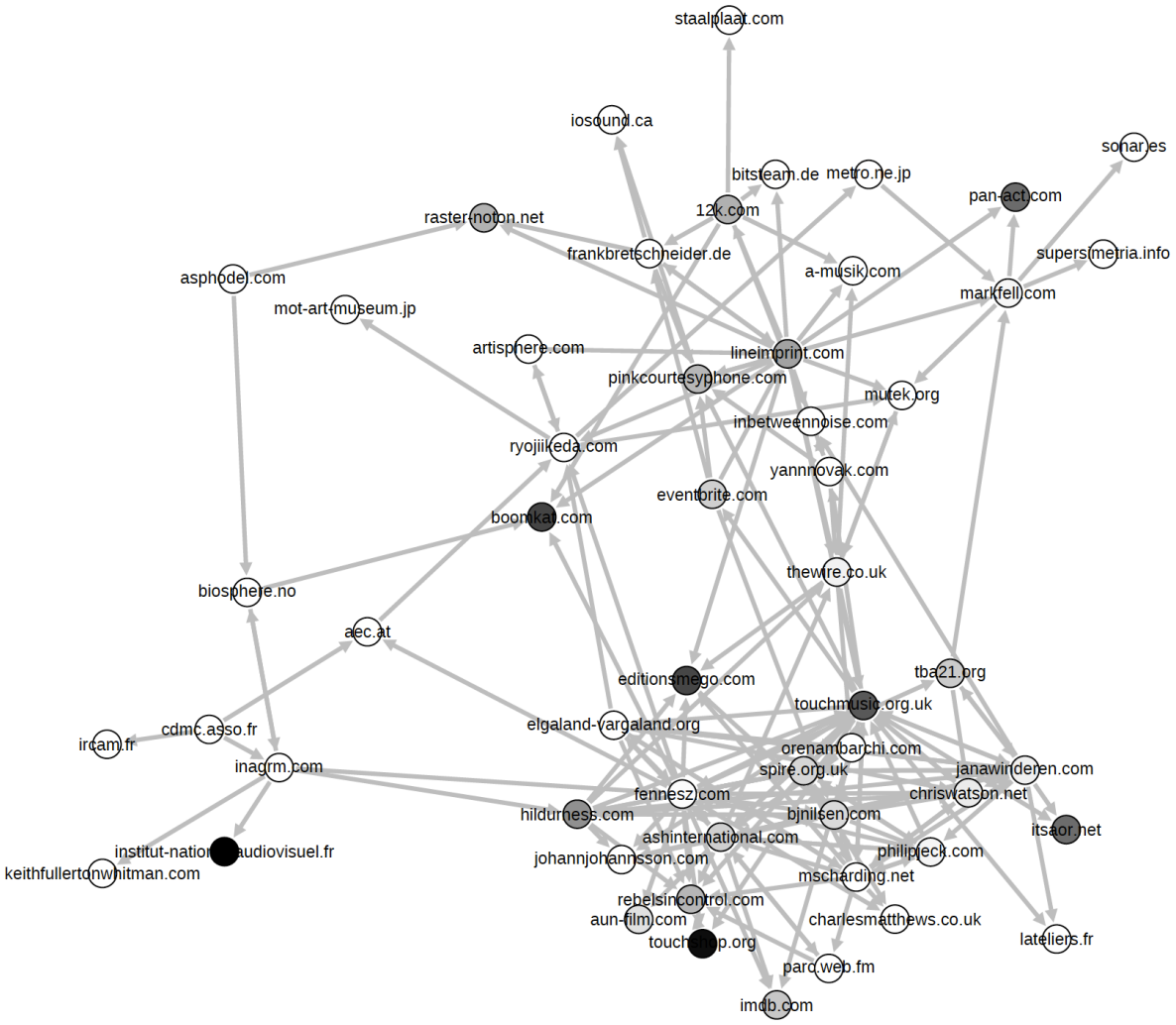


Figure 4: Issue Crawler map for microsound.

Our starting links for the IC map came from the original 1999 *.microsound* links page of signature artists and labels (Figure 3). To compile the starting URLs, however, the list had to be updated both with working links for current artists and labels and with contemporary replacements for artists and labels no longer active or those who never had web pages. Comparing the results of the web crawl with the original 1999 links page reveals that of the 39 URLs originally listed—7 labels and 32 artists—only nine appear in the resulting map. Five are labels (Raster Noton, 12k, Touch, Mego, INA-GRM) and four are nonacademic, popular artists (Christian Fennesz, Ryoji Ikeda, Mark Fell (SND) and Richard Chartier). More striking is the abundant number of institutions that appear, testifying to the genre's prominent and profuse (fourth plane) social mediations. It is the nature of these institutions, however, that points to a core finding: the strenuous aspirational efforts made by key microsound artists and labels to achieve a crossover from commercial popular music to contemporary art music and sound art. They include prestigious digital music and arts festivals like Mutek, Supersimetria and Ars Electronica (aec.at), the Thyssen-Bournemisza Foundation (tba21.org), a major private patron and collection of experimental art, and the leading international academic computer/electronic music research institutions IRCAM and INA-GRM. Moreover, a profusion of small independent and boutique art labels is juxtaposed on the map with CDMC (cdmc.asso.fr), a French state-funded archive of contemporary art music specialising in symphonic and chamber music, opera and music theatre, as well as electroacoustic music.

It is the inclusion of the composers Xenakis, Bernard Parmegiani, Barry Truax and Trevor Wishart in the IC starting links which produces hyperlinking that encompasses institutions from the academic and

art music milieux: the outlinks from the Iannis-Xenakis.org web page, for example, ensure that IRCAM, INA-GRM and CDMC, all leading French art music institutions, appear in the results. This raises the question of what role these art music composers and institutions actually play in the present assemblage that is microsound. The original links (Figure 3) to 'forebears' Xenakis, Parmegiani and Wishart are qualitatively different to the links to current artists like Richard Chartier and Nobukazu Takemura. For contemporary musicians like Chartier, the genre microsound and the mediations it assembles directly, if subtly, inform their work—whether through kinship, ambivalence or defiance. For Xenakis, Parmegiani and Truax, whose main work belongs to an earlier era, in contrast, any connection to the genre 'microsound' can only be a retrospective identification for their music, since the genre did not contribute to the horizon against which their music took shape. Linking to such historical actors may, then, illustrate a perceived genealogical bond, or express the aspiration to make a musical or social connection—but these connections are unlikely to be reciprocated.

It is therefore a contingent but perhaps foreseeable artefact of the hyperlink ecology animated by the original *.microsound* links page that, through the mediation of the earlier art composers, microsound anticipates connections to the prominent art music institutions mentioned. Thus arise the aspirational, one-way hyperlinking practices alluded to earlier in which such links foresee and potentialise relations to art music composers and institutions that, if realised, would considerably augment present-day actors' cultural and symbolic capital. However, to interpret the hyperlinking to these institutions more adequately requires closer examination of the inlinks and outlinks associated with them. This shows that although IRCAM and CDMC appear in the crawl visualisation, they stay firmly within their own art-musical milieu: neither makes any outlinks—although, at a crawl level below those links visible on Figure 4, IRCAM receives inlinks from Xenakis, Wishart, CDMC and 'Base de documentation sur la musique contemporaine' (B.R.A.H.M.S);[102] while CDMC in turn receives inlinks from Xenakis and B.R.A.H.M.S. However, INA-GRM is different: for as well as receiving inlinks, INA-GRM makes outlinks to a number of nonacademic microsound artists, including Keith Fullerton Whitman, Biosphere, Christian Fennesz and Hildur Guðnadóttir. This is a highly significant finding: it suggests that some level of robust reciprocal exchange has developed between these musicians and INA-GRM, and that this is *not* the case with IRCAM. The finding is borne out by two of these artists having held residencies at GRM, while others have been invited in recent years to perform at the Présences Électronique festival held there.[103] Together, these findings suggest that the drive among nonacademic microsound musicians since the late 90s to establish relations with international academic and art music institutions, thereby forging a pop-art crossover and garnering greater prestige and legitimacy for their work, has in part been achieved. If the existence of aspirational hyperlinking is strongly evident in the 1999 *.microsound* links page (Figure 3), then the very visibility of this strategy might be seen as a naive, early phase of the genre's life. It is a sign of the present-day confidence and 'arrival' of the nonacademic microsound artists that their current web pages no longer link to the earlier composers, having no further need to accrue prestige by association, and exhibiting greater self-sufficiency.

The presence of the Austrian Ars Electronica festival (aec.at) in the map adds further insight. In 1999 its annual prize-giving event, the Prix Ars Electronica, oversaw a major transition: the jury statement denounced the 'ancien regime of [academic] electroacoustic music' for being 'increasingly fixed and rigid… [and] awarding itself an undeserved authority at the cost of cultural irrelevance'. The Prix's Computer Music category was rebranded 'Digital Musics', and previously excluded musics made in 'bedroom studios' were welcomed, while the microsound-related Mego label gained a Distinction and was lauded for promoting a 'brand new punk computer music'.[104] The influence of the microsound

[102] Base de documentation sur la musique contemporaine is a documentary and biographical database dedicated to contemporary composers and their works, hosted by IRCAM.
[103] Notably, Whitman was commissioned to produce an 80-channel musique concrète work entitled 'Rythmes Naturels', for which he spent a week in the INA-GRM studios in October 2011, utilizing early electronic instruments held in the archive.
[104] Kodwo Eshun, 'Music from the Bedroom Studios', *Ars Electronica Archive* (1999): http://90.146.8.18/en/archives/prix_archive/prixjuryStatement.asp?iProjectID=2598.

aesthetic on these changes was implicitly signaled a year earlier when the head juror Naut Humon commented that 'what is important to "audio sense" is immediate effect rather than narrative progression or perspectival depth'.[105] By setting microsound's 'immediate effect' against the 'narrative progression' of academic electroacoustic music, Humon foresaw the end of 'thirteen years of cozy electroacoustic [art music] hegemony'.[106] These developments opened a rift with academic electroacoustic music, causing high profile composers to withdraw support from the festival. But fifteen years on, the rift has been metabolised. In accord with this history, the IC map shows Ars Electronica spanning the art-pop divide, receiving inlinks from CDMC and Fennesz, while also linking to the glitch and audiovisual artist, Ikeda. Interpreting the web crawl through the lens of ethnography and history therefore highlights a major finding: microsound as a key genre in which the boundaries between academic and nonacademic computer music—between art and pop—are strenuously being reshaped.

Equally significant is how the map visualises the growing hybridisation between microsound and adjacent media arts—including audiovisual art, new media art and gallery-based sound art. If microsound's aesthetic and conceptual kinship with late modernist art has been noted,[107] the presence in the IC map of the Tokyo Museum of Contemporary Art and the (now defunct) Virginia Artisphere suggest that, since the creation of the *.microsound* list, these connections have become more concrete. Aided by the increasing celebrity of artists like Ikeda, Fennesz, and Chris Watson, as well as the heightened profile of sound art worldwide, these links testify to microsound's successful encroachment into the global art world.

Microsound's 'promiscuity' as a crossover genre—evident in its participation in academic computer music as well as genres like techno and noise, DSP research and gallery-based sound art—poses again the question of what microsound is: genre, philosophy or technique. But although microsound is a product of the contingent historical entanglement of four trajectories—modernist composition, academic research, popular music and sound art—its promiscuity is not accidental. Rather, it is in keeping with the nature of the 'genre world' envisaged by leading members of the *.microsound* list. For microsound's generic ambiguity has been stoked by the list's discursive style, which encouraged topics of 'historical, conceptual, or experiential relevance to digital and post-digital music'[108] while discouraging exchanges on equipment, record collecting, music-making—and genre.[109] Such discursive mediation has contributed to the sense among list members that microsound is a shared sensibility unbound to genre. Yet as Jason Toynbee notes,[110] statements of *non*-belonging to genre tend to be characteristic of art and underground genres. What is clear is that the *.microsound* list, in all its ambiguity, became what Michel Callon calls an 'obligatory passage point',[111] and in the process coined a genre.

The nostalgia genre continuum

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[105] Naut Humon, 'The Conquered Banner... Bring on the Noise!', *Ars Electronica Archive (*1998): http://90.146.8.18/en/archives/prix_archive/prixJuryStatement.asp?iProjectID=2594.
[106] Tony Herrington, 'Prix Ars Electronica', *The Wire*, 208 (2001), 16.
[107] Demers, *Listening Through the Noise*, 79; Hofer, '"Atomic" Music', 300.
[108] Cascone et al, *.microsound* (1999).
[109] The front page of the *.microsound* list continues to state that it 'is not a genre list' but 'a forum for the discussion and exploration of a more general "digital aesthetic"'. Indeed, 'anything that's not aesthetic discussion' is delegated to a different forum. Ambitious transmedial connections were common in this environment, as noted in the earlier account of the projects page with its high-concept 'challenges'.
[110] Toynbee, *Making Popular Music,* 108.
[111] Michel Callon, 'Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay', in John Law (ed.), *Power, Action and Belief: A New Sociology of Knowledge?* (London, 1986), 69. Callon coins the concept when describing how three scientists 'determined a set of actors and defined their identities in such a way as to establish themselves [as] an obligatory passage point in the network of relationships they were building. This double movement… renders them indispensable in the network' (69). We translate Callon's concept for the *.microsound* list: a nonhuman actor that established itself as 'indispensable' to microsound's discursive and social mediations.

The four later genres that we examine mark out a very different terrain. Where microsound attempts to enact a convergence between nonacademic and academic electronic musics, hauntology, hypnagogic pop and vaporwave all style themselves as underground. Where microsound's materialist modernism is bound up in an ambivalent engagement with the digital, the nostalgia genres are related by shared aesthetic goals: the recovery, reimagination and remediation of past popular-cultural and media epochs. In the case of hauntology, hypnagogic pop and chillwave, this stance entails the embrace of old and obsolete analogue media—cassette tapes, boom boxes, analogue synthesizers, tape machines and samplers. If the *.microsound* email list participated in the late 90s in the post-rave alternative culture cultivated by hyperreal.org, by the time of the emergence of the nostalgia genres in the mid-2000s the internet was saturated by commercially-hosted emailing lists and message boards covering many facets of culture. The web's ubiquity and growing commercialism fuelled a widespread conviction that it could no longer host underground musics; indeed, according to a prominent critic, the web had 'extinguished the idea of a true underground'.[112] Through deliberately restricted circuits of production and exchange—via cassette tape, vinyl and CD-R releases in strictly limited editions—hauntology, hypnagogic pop and chillwave evidence an imperative to move cultural production offline, their aesthetic and material politics pitted against the dominant medium of the twenty-first century. Yet despite their 'pre-' or anti-digital imaginaries, the IC results point to a defining paradox: for all three genres manifest hybrid, analogue-digital media ecologies. As with microsound, music's material mediation is therefore very much to the fore—but in paradoxical ways. Nonetheless, as we noted earlier, analysing their online manifestations provides insight into their distinctiveness as genres, highlighting how central to their generic identities are their non-sonic mediations.

Hauntology and the unfulfilled promise of the 1960s and 70s

The term 'hauntology' was first employed in relation to music by the critic and cultural theorist Mark Fisher, who, with knowing reference to the philosopher Jacques Derrida,[113] wrote a feature on his 'k-punk' blog in which he applied the term to the influential Ghost Box label. He wrote that records released by the label conjured a

> sense of artificial déjà vu, where you are duped into thinking that what you are hearing has its origin somewhere in the late 60s or early 70s. Not false, but simulated, memory. The spectres in Ghost Box's hauntology are the lost contexts which, we imagine, must have prompted the sounds we are hearing; lost programmes, uncommissioned series, pilots that were never followed-up.[114]

A year later, the critic Simon Reynolds extrapolated from Ghost Box to describe a whole electronic music underground. Writing on his own 'blissblog', he suggested that hauntology described the coalescence of a 'new genre or network of shared sensibility, comparable perhaps to "isolationism"'.[115] Central to this shared sensibility was a commitment to a specific spatio-temporal imaginary: Britain in the 1960s and 70s. Through the sound samples and design aesthetic employed by artists associated with the genre, hauntology releases assemble a surreal semiosis, a melange of post-War signifiers that are simultaneously utopian, eerie and cute: new towns, garden cities, public libraries, Penguin books, comprehensive schools, polytechnics, patrician BBC voices, educational

[112] Simon Reynolds, *Bring the Noise: 20 Years of Writing About Hip Rock and Hip Hop* (London, 2007).
[113] Coined by Derrida as a pun on 'ontology', 'hauntology' has a specific meaning in the philosophy of history. It describes a 'spectral' agency that acts in and on the present from beyond. For Derrida, it was Marxism after the fall of communism in 1989 that raised the figure of the spectre. Neither alive nor dead, present nor absent, the left nevertheless feels a responsibility to Marxism—to preserve it. In his article, Fisher kept Derrida's concept more or less intact.
[114] Mark Fisher, 'Unhomesickness', *k-punk* (2005): http://k-punk.abstractdynamics.org/archives/006414.html.
[115] The term isolationism enjoyed cachet in the mid-90s as a term for a doomy, dissonant type of ambient music, later superseded by dark ambient. It was also the title of a 1994 compilation album released by Virgin Records in its Ambient series. Simon Reynolds, 'Wednesday, January 11', *blissblog* (2006): http://blissout.blogspot.co.uk/2006/01/mike-powell-evocative-and-thought.html.

television, library music, cult children's television shows like ITV's Children of the Stones, and the sounds of the BBC Radiophonic Workshop.[116]

The philosophical provenance of the term ensured that hauntology was never 'just' a music genre for these writers and their followers. As well as articulating a particular style of electronic music, the concept operated as an instrument of critique and cultural diagnosis attuned to the analysis of the (then) present. In an article for the leftist journal *Radical Philosophy*, the architecture critic and prominent blogger, Owen Hatherley, wrote that the hauntology aesthetic—with its associations of a forward-looking, optimistic era of British social democracy perceived retrospectively to come to a definitive end with the election of Margaret Thatcher in 1979—offered an alternative to the prevailing 'austerity nostalgia' industry, exemplified by the 'Keep Calm and Carry On' posters that flooded the country after the financial crash of 2008. 'Instead of hankering for the past in the context of neoliberalism's unforgiving bull market, [the Ghost Box label's] aesthetic suggests a haunting of the present by the unfulfilled promises of the past'.[117] In marked contrast to microsound's apolitical discursive abstractions, then, a particular style of politicised, blog-based discourse, allied to a dream-like 'return of the social-democratic repressed',[118] was hauntology's most pronounced non-sonic mediation.

[116] The BBC Radiophonic Workshop was itself a key point of convergence between electronic art music (including the techniques of musique concrète) and popular television and soundtracks, through the activities of such composers as Delia Derbyshire, Daphne Oram and Maddalena Fagandini. See Louis Niebur, *Special Sound: The Creation and Legacy of the BBC Radiophonic Workshop* (Oxford, 2010). A selection of signature hauntology tracks can be accessed through these links:
https://www.youtube.com/watch?v=yGW05V7nCOQ&list=PLyeitmL4jzs15Gb4fXMXZFcOlx3K38uZt;
https://www.youtube.com/watch?v=F7bKe_Zgk4o;
https://www.youtube.com/watch?v=iH3fSojSk2w.
[117] Owen Hatherley, 'Lash Out and Cover Up: Austerity Nostalgia and Ironic Authoritarianism in Recession Britain', *Radical Philosophy*, 157 (2009).
[118] Ibid., 4.

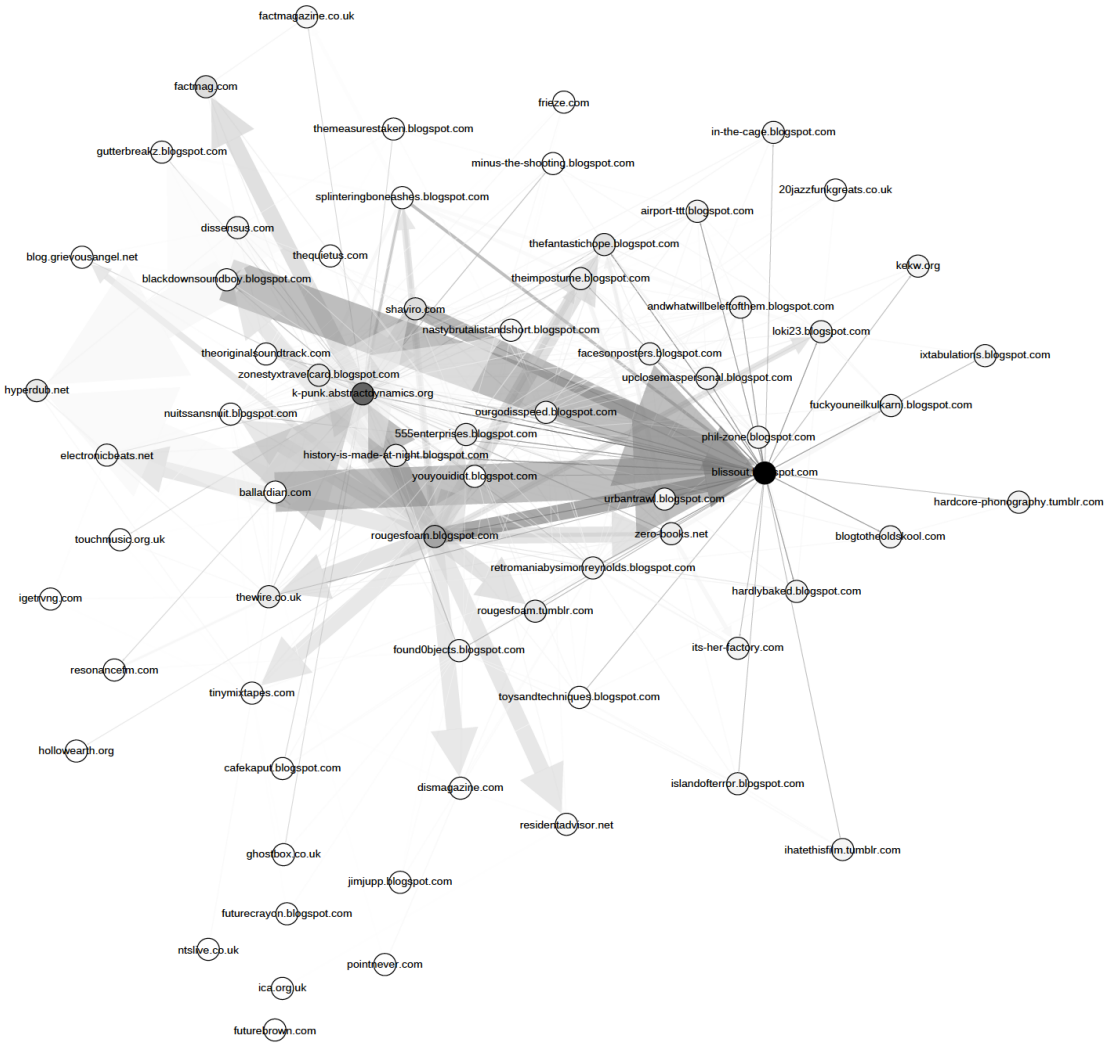


Figure 5: Issue Crawler map for hauntology

Despite hauntology's fixation on the past, it was very much a phenomenon of the mid-2000s. For it was in the burgeoning channels of the blogosphere that hauntology's dual identity—part music genre, part object of underground theory—took hold. Indeed, the genre's rise coincided with the peak of the blog as a cultural form: specifically, hauntology was incubated in the Blogger (.blogspot.com) social network, a service purchased by Google in 2003. The IC map (Figure 5) makes abundantly clear the core role of blogging in the genre. The three most prominent actors are critics: Simon Reynolds ('blissout.blogspot'), Mark Fisher ('k-punk.abstractdynamics.org'), and Adam Harper ('rougesfoam.blogspot'); while other writers that appear include Steven Shaviro (Shaviro.net), Alex Niven (thefantastichope.blogspot) and Sam Davies (zonestyxtravelcard.blogspot). A musical actor, the influential Hyperdub label, appears only as the eleventh-ranked actor by density of hyperlinking (a ranking evident in the light-grey colouring of the Hyperdub node in Figure 5).

Indeed, the topography of the hauntology IC visualisation is the inverse of what one might expect such a genre map to look like. Instead of appearing at the centre, musicians (Oneohtrix Point Never), albums (Broadcast's *Future Crayon*) and labels (Hyperdub, Ghostbox) lie on the periphery, while the blogs of leading critics and other intermediaries that might be expected to occupy the periphery appear as a dense network in the centre. This distinctive layout stems from the nature of the hyperlinking practices. The IC algorithm privileges the frequent, reciprocal exchange of hyperlinks between actors. The more a group of actors engages in such exchanges, the more they cluster together; while fewer inlinks and outlinks means that an actor is positioned on the periphery of the map (or fails to appear at

all). Generally, bloggers gain prestige (symbolic capital) according to the number of 'hits' achieved by their blog pages. Hauntology actors using .blogspot.com link liberally to each others' posts, both as a citation strategy in the heat of a thread, debate or controversy, and to enact their belonging to this discursive-and-social network. As a result, they appear clustered in the centre. This blog-based hyperlink ecology corresponds well to that characteristic dynamic of artistic fields mentioned earlier: the eruption of an 'inflationary cycle' in the accumulation of charisma, cultural and symbolic capital among artists and key intermediaries—critics, agents, impresarios. By intensifying their relations, these actors can collude in a mutual valorisation—a contagious circulation in which charisma is 'passed around a network of interested parties who each have an investment.... [And as a consequence, such charisma] tends to escalate, to be an inflationary currency'.[119] Just this process is manifest in the IC results in the intensive mutual hyperlinking between critics and theorists invested in hauntology. Examining the hyperlinks made by each actor we see that the blogger, theorist and *The Wire* contributor[120] Adam Harper ('rougesfoam') makes c. 170 links to Simon Reynolds ('blissblog'), whilst Reynolds links back to Harper c. 120 times. Reynolds links to Mark Fisher ('k-punk.abstractdynamics') c. 140 times, but the latter only links back five times. As well as ramping up the significance of each others' blogs, these actors also extend their patronage, as befits the 'democractic' orientation of the genre, to less known and anonymous bloggers—to Alex (splinteringboneashes.blogspot), Carl Nevile (theimpostume.blogspot) and so on.

This dynamic inflationary cycle, occupying the centre of the hauntology IC map, is in stark contrast to the restrained practices of the labels on its outskirts. For unless they are run from a .blogspot page, which usually indicates a small tape label, hauntology labels tend to link rarely, confining themselves to their own offline economic networks—these labels manifesting the particular form taken by hauntology's hybrid, online-offline economy. Although born partly of the need to assert independence from competitors in a narrow market, this 'autarchic' ethic functions also as a public display of authority. Such hyperlinking restraint appears to apply equally to small-scale, incipient enterprises and to well-established, prestigious labels. While it is clear that the latter do not need to link to others in order to acquire custom and esteem, for small labels this is less obvious. We might see this behaviour as evidence that in these circles the practice of enthusiastically dispensing links online has gone out of fashion, replaced by a sober practice of linking only to distributors and other 'real world' collaborators. In general, this change attests to the declining influence of the mandatory 'links page' on personalised websites—a central discursive element of the earlier microsound assemblage.

What, then, is the extent of hauntology's various mediations as they appear in its hyperlink ecology? Most obviously, IC reveals how prominent is the genre's discursive mediation, manifest in the dense hierarchy of bloggers and in the intensity of their mutual valorisation. Yet this discursivity also ignites the genre's social mediation, through the mutual catalysis of three planes. First, in the way this discursivity engenders a (first plane) online sociality of reciprocal, inter-referential creative practices imbued with the competitive prestige economy described. Second, in the guise of a highly developed (second plane) musically-imagined community, one that fuses musical with cultural, political, ideological and philosophical passions and affiliations. And third, through the *substance* of the blog-based discursivity which—centred on a phantasmic figuring of a British social democratic 'past'—refracts and (re)activates identification with a (third plane) social formation: a national imaginary.

Hypnagogic pop: The cassette as palimpsest of sonic memory

If hauntology's nostalgia is for particular cultural elements drawn from Britain's cultural landscape from the 1960s to the late 70s, then hypnagogic pop (h-pop) unleashes an equivalent nostalgia, but with a geo-temporal shift—for the cultural material at the core of the genre is the individualistic, desire-manufacturing mediascape of the American west coast, with a focus on the 1980s. Emerging in

[119] Born, *Rationalizing Culture*, 91-4.
[120] *The Wire* is an influential British-based experimental music magazine: all four of the prominent critics mentioned in this article have written for it regularly. It is nonetheless held ambivalently by many experimental musicians.

part from the American noise, drone and improvisation scenes of the mid-2000s, h-pop took noise's obsession with analogue performance and distribution media in a more narrative direction—as though the media through which music is experienced cannot be dissociated from the cultures in which it acquires its meaning. The h-pop aesthetic therefore rested on a particular technological imaginary: it was less about recovering a particular 'sound' that has been 'lost' to digitisation, as in hauntology; rather, it entailed the idea of technology as itself a portal to the past and an inscription of an era's cultural values. Central to this stance was h-pop's preference for the 'lo-fi' home cassette tape, a format associated with the 1980s and the genesis of portable music. H-pop artists cultivated a knowing aesthetic centred around the material quirks of the format, embracing tape flutter, hiss and distortion as well as the effect whereby traces of supposedly 'erased' recordings remain audible beneath the main tracks. In h-pop, these palimpsestic layers of audio became a sonic metaphor for memory, an abiding theme that can be read off track titles like Oneohtrix Point Never's 'Memory Vague', James Ferraro's 'Memory Theater' and Liz Harris AKA Grouper's 'Dream Loss'.[121]

As with hauntology, the genre's emergence was deciphered and named by a critic: David Keenan, a contributor to *The Wire* magazine. With 'hypnagogic', Keenan pointed to the state between sleep and wakefulness, and he elaborated on the genre's qualities:

> Hypnagogic pop is pop music refracted through the memory of a memory. It draws its power from the 1980s pop culture into which many of the genre's players were born, and which is only now being factored into underground music as a spectral influence.[122]

As with the email list in microsound and the blog in hauntology, it was an internet-specific material mediation that catalysed the genrefication of h-pop: the rise of YouTube. The video sharing site debuted in late 2005, and within a couple of years had become the third most viewed website on the internet.[123] YouTube drove the internet-based disintermediation of pre-existing audio and audiovisual material, offering a platform and a digital archive in which any item of 'digital content' could co-exist indiscriminately with others—classical music alongside television shows, home videos, advertisements, underground cinema, rare bootlegs and so on. Indeed, h-pop was fuelled by the new collective sense animated by YouTube that institutionalised canons and associated genre distinctions could be overturned and reassembled as personalised genealogies—via playlists or 'channels'—as well as distorted, exaggerated or made strange. Thus, in h-pop, affectionately-recalled yet derided music genres like new age, exotica and easy listening were mixed with film and TV soundtracks as well as signifiers rooted in American individualism—self-help videos, straight-to-video surf movies, Hard Rock Cafes, gyms and celebrity culture. Such disparate musical and cultural materials became subject to cultural transvaluation through subtle processes of sonic and generic reframing. Most strikingly, very specific, quasi- 'autobiographical' sonic signifiers—the production style of 'Boys of Summer' by Don Henley, the synthesiser sound on 'Hounds of Love' by Kate Bush, the echo on the guitar of 'Big City Talk' by Mark Hunter—were picked out and elevated, their qualities reified as defining features of the genre. The aesthetics of h-pop were encapsulated in what became the quintessential track, uploaded to YouTube in 2009: Oneohtrix Point Never's 'Nobody Here'. The track mixed a never-ending rainbow road drawn from a 1983 laser-disc game commercial with a processed sample from Chris de Burgh's track 'Lady In Red', endlessly looped.[124]

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[121] Oneohtrix Point Never, *Memory Vague*, Root Strata (RS43), 2009; James Ferraro, *Marble Surf,* New Age Tapes, 2008; Grouper, *A I A: Dream Loss,* Yellow Electric, 2011.
[122] David Keenan, 'Childhood's End', *The Wire*, 306 (2009), 26.
[123] See http://www.alexa.com/topsites.
[124] See https://www.youtube.com/watch?v=-RFunvF0mDw. Other signature h-pop tracks include https://www.youtube.com/watch?v=vWlRoC807nY; https://youtu.be/iEsBE5Jqvp4; https://youtu.be/wiLqAu4s-s; https://youtu.be/4mxQJyjDrOM.

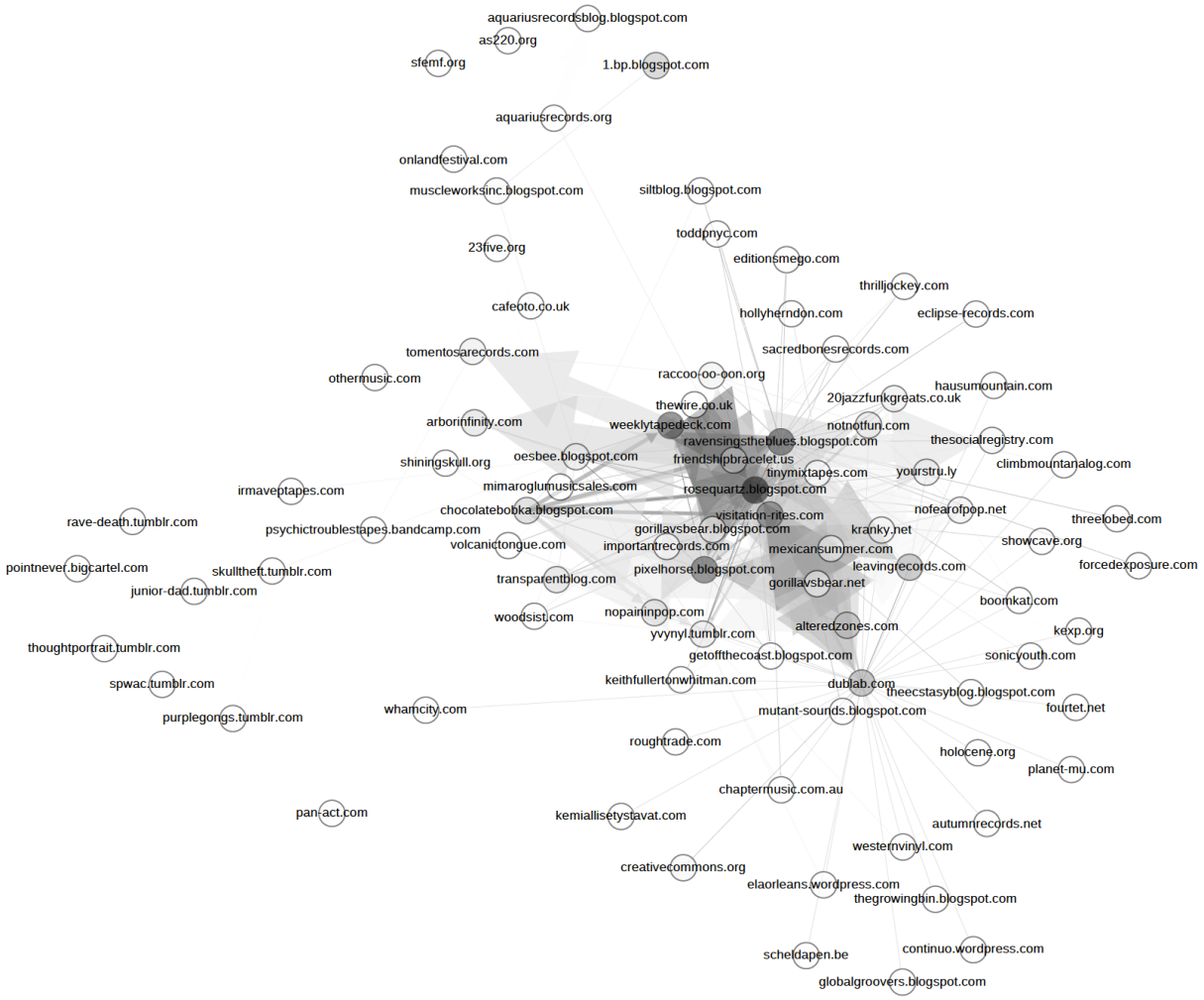


Figure 6: Issue Crawler map for hypnagogic pop

H-pop combined its devotion to YouTube with a preference for the severely restricted modes of exchange characteristic of the DIY scene of the 1980s—an inheritance from the US noise scene. In the genre's underground economy, the lag and delay of mail order record deliveries were privileged over the instantaneous circulation of the web; 'old' media systems such as cassette tape over integrated 'new media' ones like the audio platform Soundcloud; and the mystique and aura that come from restricted access and information over the noise and information excess characteristic of social media. Although these core genre commitments are in some ways 'anti-internet', they are clearly signalled in the h-pop IC map (Figure 6). It highlights a large number of small labels and independent record stores, far more than appear in the other genre maps. Many are cassette tape labels run by a single person, such as Leaving Records and Olde English Spelling Bee; while Volcanic Tongue, the now-defunct underground label and store run by David Keenan and Heather Leigh Murray from Glasgow, is another key actor, indexing both the genre's independence and its transnational imaginary—evident in the fantasised, pleasurable identification proffered by h-pop with the California of the 80s.

However, this sense of an h-pop underground dissipates as we stray from the central cluster on the map. Although labels and groups such as Thrill Jockey, Drag City, Kranky, Rough Trade, Planet-Mu, Four Tet and Sonic Youth are strong participants in the UK and US indie and alternative music scenes, their appearance on the map along with their diverse genre affiliations-–from IDM[125] to noise rock—

[125] IDM ('intelligent dance music') is an American term for a style of electronic dance music (EDM) that developed out of techno and breakbeat in the mid 90s. Retaining strong links to EDM in terms of sounds and

raises questions about h-pop's distinctiveness as a genre. Some of these nonspecific results are byproducts of the IC method. Four Tet appears, for example, because he has remixed Grimes, an artist loosely associated with h-pop and chillwave; and Four Tet's influence across indie/alternative, folk, improvisation and dance music scenes draws a host of associated actors into the h-pop network: the festivals Flow and Dimensions, and his own collaboration with the late drummer Steve Reid. More generally, the clash between the amateur tape labels in the centre and the professional labels on the outskirts of the h-pop map betrays a genre in transition—from underground status in the late 2000s to mainstream indie by the start of the 2010s. It is h-pop's migration 'overground' that crystallised in the emergence of chillwave in 2009, a transition that we pursue in the next section.

H-pop's main online manifestation, then, is the storm of tiny cassette labels at the centre of the map, affirming the prominence in this assemblage of a combination of material and (fourth plane) social mediations: how the economy afforded by the genre's preferred medium of cassette tape favours small, independent labels as an organisational form. But the IC results also reveal the limits of the method: there is otherwise little specific to h-pop on the map, and the genre appears diffuse, a transitory entity that, as we will see, issues in two distinct generic directions—chillwave and vaporwave. This points to another finding: how, despite a critic's attempts to catalyse the emergence of a genre, there are limits to her/his performative powers. If Keenan attempted to coin hypnagogic pop—a move that, if successful, endows both genre and critic with kudos—it had a transitional quality and failed to consolidate, a casualty in the rapid competitive repositioning of internet-mediated genres.[126]

Chillwave: Indie mainstream and disciplined hyperlinking

Chillwave came to life, like hauntology, in the blogosphere. Coined in a throwaway post by a writer known as 'Carles' on the influential Hipster Runoff blog,[127] the term enjoys a much wider fame than the other genres discussed in this article. Crucially for the fate of h-pop, certain core artists cited in Keenan's 2009 definitive article on the genre—Ducktails, Ariel Pink and Pocohaunted—came in due course to be associated with the more popular chillwave.[128] Indeed, it was chillwave's embrace of cassette tape, inherited from h-pop, that contributed to the wider resurgence of the once-derided medium.[129] Yet if h-pop did not acquire sufficient 'legibility' as a genre[130] and was vulnerable to subsumption by chillwave (and later vaporwave), this does not mean that it is indistinguishable from chillwave. Where h-pop embodies a resolutely lo-fi, surreal tape-collage aesthetic, chillwave centres unambiguously on 'proper' pop songs with verses and choruses. H-pop's emphasis on the production styles and timbres of past pop-cultural epochs remains, but its tape-collage, high-school-mixtape surrealism is absent from the later genre. Chillwave's professionalism is matched by its mainstream status, strikingly clear in the actors revealed by the web crawl (Figure 7). The IC map renders visible how the key shift between the two genres takes the form of a transition in (fourth plane) social mediation. In marked contrast to h-pop's tiny cassette labels, chillwave is associated with larger established labels like 4AD and Rough Trade. Moreover, the prominence on the map of mainstream

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samples, IDM nonetheless took directions too complex to be played on the dancefloor: see, for example, the music of Autechre and Venetian Snares.

[126] From its emergence, h-pop was scrutinised because of its similarity to hauntology (eg Reynolds 2009). Symptomatically, of all the genres analysed in this article, h-pop is the only one that does not appear on Glenn McDonald's comprehensive 'Every Noise at Once' genre map (http://everynoise.com/engenremap.html).

[127] See http://web.archive.org/web/20120821172541/http://www.hipsterrunoff.com/node/1780 (27 June 2009).

[128] Characteristic chillwave tracks can be found here: https://youtu.be/uxqsMJy5HeI; https://www.youtube.com/watch?v=-DkslcOhytU&index=1&list=RD-DkslcOhytU; https://youtu.be/hyO7P6LE7nA.

[129] The renewed interest in cassette tape has been discussed in numerous feature articles in mainstream media: see http://www.theguardian.com/music/2010/mar/29/audio-cassette-comeback; http://www.bbc.co.uk/news/business-22533522; http://www.esquire.com/entertainment/movies/a30459/the-return-of-the-cassette/; http://www.independent.co.uk/arts-entertainment/music/features/a-comeback-for-the-humble-cassette-9358916.html.

[130] Brackett, 'Popular Music Genres', 195.

ticketing agencies and gig news websites (Seetickets, Songkick) points to chillwave musicians' engagement in international tours—uncommon in h-pop. Equally visible is how chillwave artists operate through major promoters (PCL Presents), make music videos (vimeo.com), perform at large festivals (Green Man, Lowlands, Flow) and commission big name producers to do remixes (Four Tet, The Chemical Brothers). Testifying further to chillwave's 'overground' status is the relative *insignificance* of discursive mediation—in comparison with hauntology's theory blogs or the philosophical discourse of microsound.

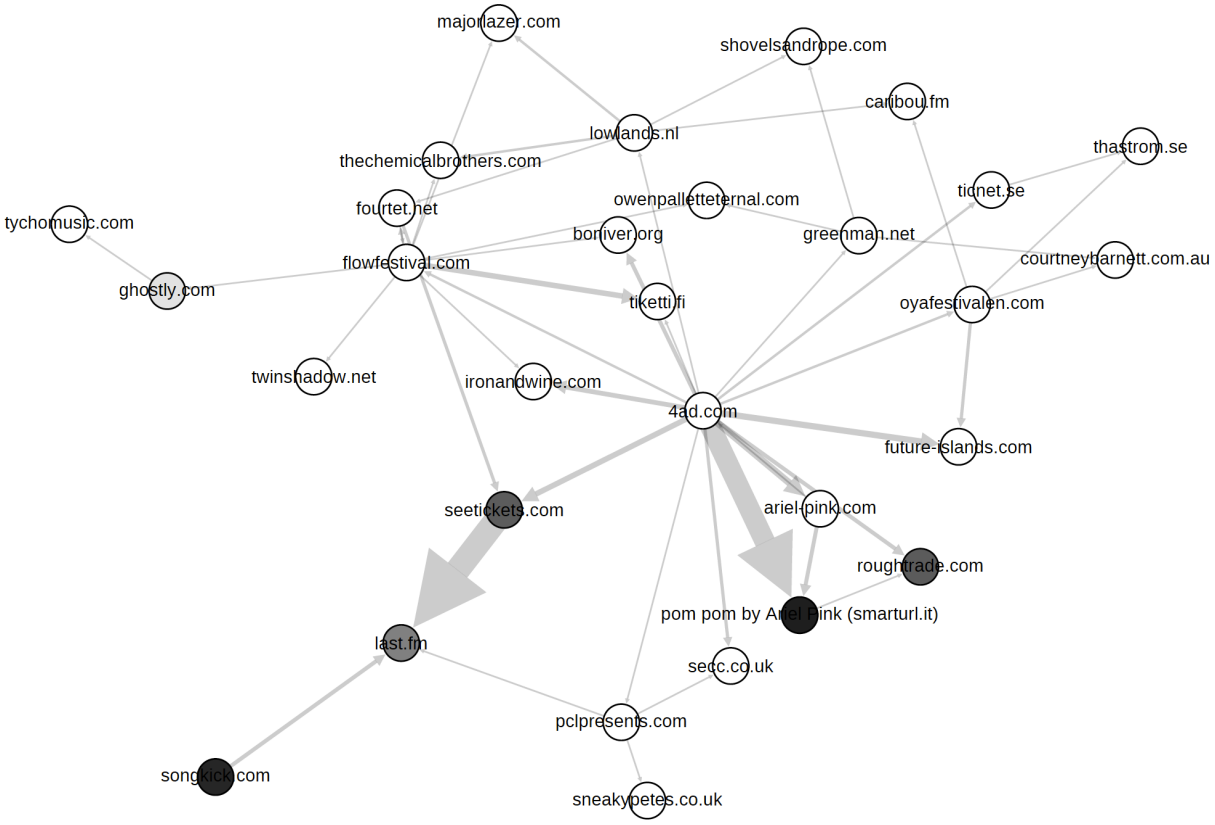


Figure 7: Issue Crawler map for chillwave

In marked contrast to h-pop, then, the chillwave map portrays an established commercial genre. Comparing the two maps makes palpable both their differences, embodied in their very different (fourth plane) social mediations, and chillwave's inheritance from h-pop, obvious in the material mediation of the cassette tape and in the reappearance of certain actors (Four Tet, Flow Festival, Rough Trade). In keeping with these findings, where the other genres maps exhibit an idiosyncratic sprawl of actors, the chillwave map has a uniform and commercial 'gestalt': it shows orderly, instrumental linking between labels, festivals, ticketing agencies, radio stations, social media, stores, artists and producers. Indeed, chillwave's disciplined hyperlinking suggests that many of these actors have professional 'site managers' curating their links. However, rather than chillwave fully subsuming h-pop, the IC results for vaporwave, the final genre that we address, suggests that it too retains aspects of the earlier evanescent genre. H-pop, it becomes clear, effectively bifurcated: if chillwave amounts to one trajectory out of the earlier genre, via its professionalisation and translation into the US indie mainstream, then vaporwave represents an alternative trajectory—one that mines more deeply, and *détournes*, h-pop's underground status and its aesthetic and conceptual affordances.

Vaporwave, interface aesthetics, and the reflexive return of the early net

Vaporwave is the most 'current' of the nostalgia genres. Like the previous three, it reanimates a historical period or past; but with considerable irony, the 'past' that it resurrects is that of the late

1990s to the present—the 'digital age'. In comparison with the previous genres, moreover, what is remarkable about vaporwave is the extent to which it embraces the internet itself both as an aesthetic medium and as a space for the cultivation of expansive, sometimes surreal social and material relations. While in hauntology and h-pop, the genres' paratextual visual mediations were properly subordinate to musical sound—whether in Ghost Box's heavily stylised visual citations of 1960s BBC logos on album sleeves, or the endlessly xeroxed images of Californian sunsets that adorn h-pop cassettes—vaporwave's engagement with the internet as an aesthetic medium has the effect of elevating the genre's visual mediations so that they gain far greater significance. The maelstrom of online images, GIFs,[131] videos and interactive media that constitute vaporwave's 'interface aesthetic'[132] has the effect of demoting sound, rendering it just another mediation in the wider assemblage. Yet the genre's much-expanded aesthetic practice does not produce stylistic heterogeneity. On the contrary: vaporwave's ironic embrace of the digitally-native platforms and practices in which it was gestated contributes to an almost overly coherent genre identity. Indeed, Vaporwave circulates more like a 'meme' than a music genre,[133] its profuse 'user-generated content' marked by rigid sonic and visual conventions and an extraordinary unity between subcultural style and aesthetics, fuelled by rapid and contagious imitation and citation.[134]

Vaporwave's aesthetics do not end with sounds and images, but encompass every aspect of its online mediation. The web crawl (Figure 9) reveals how surreal stylisations of 'net-native' practices—the very activity of making and following hyperlinks, or of surfing from one point in cyberspace to another—have become focal for the 'vernacular creativity' at the heart of the genre.[135] Indeed, vaporwave's online subculture embodies the participatory, user-generated content ethos of 'web 2.0':[136] it is peopled by obscure, pseudonymous avatars that pass for 'subjects', their names comprised of long, unpronounceable strings of symbols and characters, or Japanese translations of English phrases. The genre manifests a weak separation between producers and audiences, its surreal practices riffing implicitly on notions of DIY, the amateur, or 'dark matter'.[137] The online subculture is, in fact, all there is to the genre, at least in its mature development: there are few 'offline' entities to which it is related. Vaporwave therefore presents a startling example both of the extent to which music genres are migrating online and of the effects of this migration in transforming the nature of genre today.

The emergence of the name 'vaporwave' gives a compelling portrait of the life of music genres online. A pun on 'vaporware'—the term for commercial software that is publicly announced but never goes into production—it first appeared in 2011 in an anonymous post on the experimental music blog and extra-legal download site, Weedtemple, where the author used it to describe the sound of *Surfs Pure Hearts* by Girlhood. Not long after, vaporwave began to appear as a hashtag accompanying websites, soundfiles, images, GIFs and other media uploaded extra-legally and posted on anonymous blogs, Soundcloud and the online radio station Last.fm. The music's aesthetic framing by a technological imaginary—the 'digital' as medium, age and ideology—was akin to h-pop's; but in this case, a 'hi fi', multimedia production aesthetic drawn from the 1990s was to the fore. Where, in h-pop, the qualities of cassette and video tape act as a portal into 1980s American consumer culture, vaporwave's knowing aesthetics of the digital draws on the combined semiotic and material associations of lossless

[131] GIF (Graphics Interchange Format) is a simple format for producing short, silent animations. Developed in 1987, the GIF format has continued to exert an influence in internet subcultures, despite its low quality.
[132] Soren Pold, 'Interface Realisms: The Interface as Aesthetic Form', *Postmodern Culture*, 15, 2 (2005).
[133] Limor Shifman, *Memes in Digital Culture* (Cambridge, MA, 2013); Bradley E. Wiggins and G. Bret Bowers, 'Memes as Genre: A Structurational Analysis of the Memescape', *New Media & Society*, 17, 11 (2014), 1886 – 1906.
[134] Gabriel Tarde, *The Laws of Imitation* (New York, 1903); Gabriel Tarde, *On Communication and Social Influence* (Chicago, 1969). On Tarde's analysis of imitation, see Georgina Born, 'On Tardean Relations', in Mattei Candea, *The Social After Gabriel Tarde* (London, 2010), 230-47, especially 236-42.
[135] Jean Burgess, *Vernacular Creativity and New Media*. PhD thesis, Queensland University of Technology (2007): http://eprints.qut.edu.au/16378/.
[136] On the concepts of 'web 1.0' and 'web 2.0', see Tim O'Reilly, *What Is Web 2.0?* (Sebastopol, CA, 2009).
[137] Gregory Sholette, *Dark Matter: Art and Politics in the Age of Enterprise Culture* (London, 2010).

reproduction, transparent 'immateriality' and ubiquity that have accrued to pervasive digital file formats like the MP3.[138]

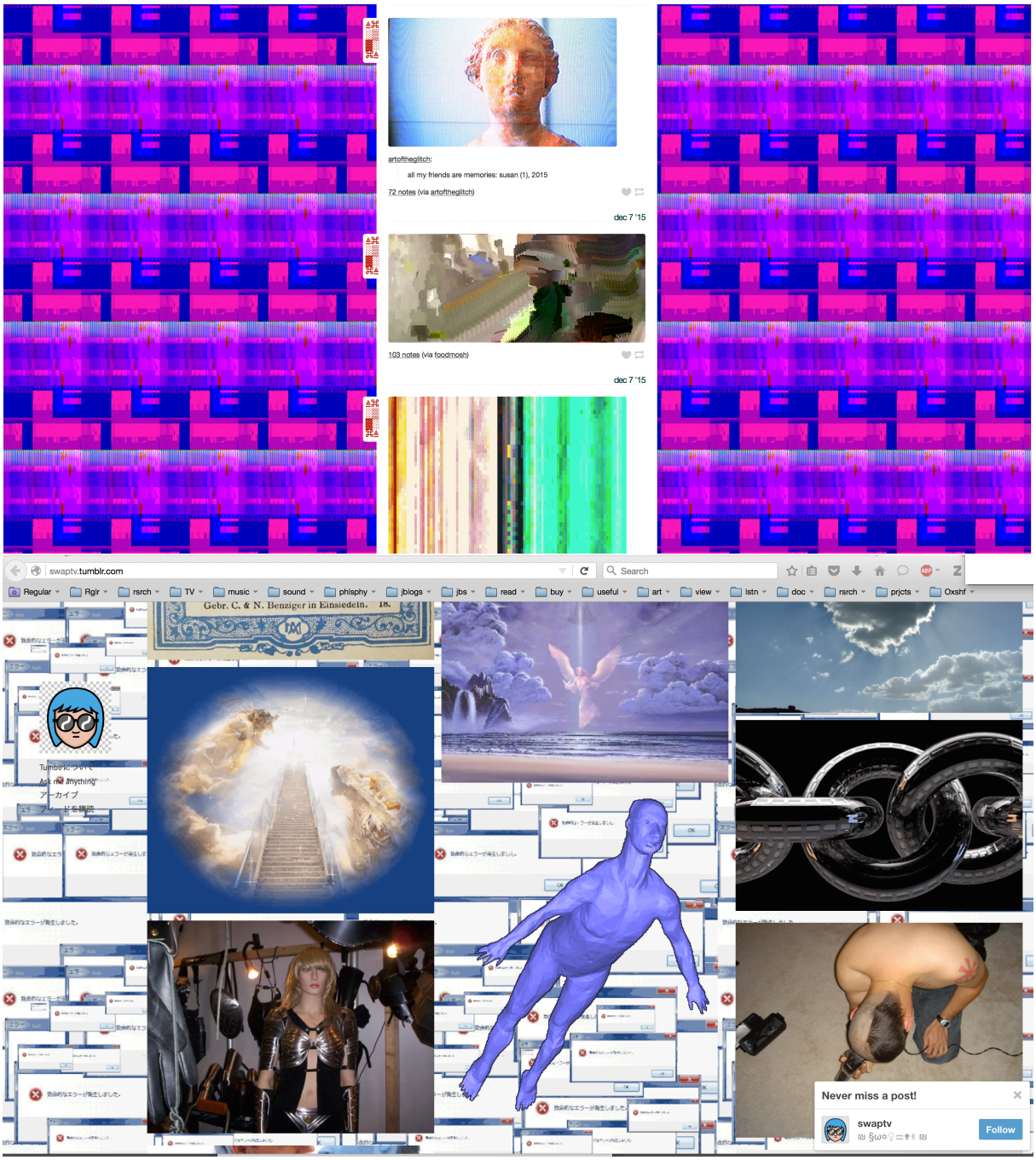


Figure 8: Screenshots of swaptv.tumblr.com (top) and glitchgifs.tumblr.com

James Ferraro's *Far Side Virtual* album is often credited with crystallising the vaporwave sound, and his former role as one of h-pop's main artists and most enthusiastic advocates attests to the continuities between the two genres.[139] The album revolves around uncanny parodies of genres that are rarely listened to as music: elevator music ('muzak'), advertising soundtracks (particularly those

[138] Jonathan Sterne, *MP3: The Meaning of a Format* (Durham, NC, 2012).
[139] Further reinforcing the perceived link to h-pop is the citing of Daniel Lopatin of Oneohtrix Point Never's *Eccojams Vol. 1* as a precursor of vaporwave. Lopatin's album is composed entirely of slowed-down loops of recycled 80s hits: https://www.youtube.com/watch?v=X8fM-CGQVCY.

for consumer electronics, luxury hotels and other icons of consumer capitalism), computer game soundtracks, and sonic branding and idents. These are integrated with trashy, even 'taboo' electronic sounds: unmodified synthesiser presets and MIDI sounds, automated voice commands, ringtones and other digital sonic detritus. The vaporwave music that emerged on the net, generated by the online subculture, tends to be even cheaper, more cryptic and throwaway than *Far Side Virtual*. These albums often recycle sounds sourced from the internet—crude samples of muzak, funk, popular jazz, TV advertising music, ringtones and so on—accompanied by strange visual collages of 90s computer graphics, old home computers and desktop PCs, anachronistic juxtapositions of desktop computers with outdated 3D graphics, retail parks, isolated Japanese cityscapes, and idealised images from Japanese popular culture—invariably in neon colours. The albums are rapidly produced (by downloading) and distributed (by uploading), aspiring less to be original than to evoke the bizarre experience of surfing the continuous flow of data online.[140]

Despite the apparently 'folksonomic' (or bottom up) genesis of vaporwave in the anonymous cyber-underground, its emergence as a genre was once more catalysed by discursive mediation. In 2012 the critic Adam Harper contributed a definitive essay about the genre to the influential Dummy webzine. The essay served to articulate and consolidate vaporwave's characteristics and was instrumental in bringing the genre to public attention.[141] Echoing Reynolds, Fisher and Keenan, Harper couched the trend firmly in the terms of philosophy and cultural theory. Specifically, he attached vaporwave to the intellectual vogue for 'Accelerationism': a post-Marxist political theory positing, broadly, that capitalism should not be resisted but sped up and accelerated until it is pulled apart by its own contradictions.[142] Given vaporwave's ambivalent refusal to commit to either celebration or critique of late capitalism's 'desire manufacturing', along with its absurdist premise of bringing the nostalgia genres' fixation on the past up to the present day, vaporwave appeared an almost-too-perfect manifestation of Accelerationist fatalism.

However, rather than the genre resulting from a critic's 'crest-riding' or post hoc designation, in vaporwave it is the *condition of being a genre*—manifest in its rigid sonic and visual conventions, and its immediately identifiable online subculture—that appears to be a primary, ironic and meta-reflexive concern. Compared to the previous genres, it is remarkable how intensely committed are participants to defining, honing and reproducing the vaporwave aesthetic, creating in this way a radically involuted, self-sufficient online 'genre world'. Artists, fans, critics and labels—inasmuch as such distinct roles exist in vaporwave—exhibit an unprecedented reflexivity about the constitution and life of the genre. The effect of the rapid circulation of memes—through continuous processes of appropriation and mimesis—is therefore purposefully to unbalance the usual economy of repetition and difference negotiated by all genres, and to weight the scales almost entirely towards relatively unchanging reproduction. Where, in many genres, critics' discourses can have the controversial effect of reifying music, audiences and their relation,[143] in vaporwave reification is embraced as a creative telos and participants are enthusiastically involved in the genre's reification. In this way, vaporwave amounts to a self-conscious manifestation of Kenneth Goldsmith's notion of 'uncreativity'[144]—now rendered en masse, as a subculture.

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[140] Vaporwave's distinctive audiovisual aesthetic can be gleaned from the following links: https://youtu.be/YXHCv77IOAE?list=PLDaU3IXq3NJU2K0Hn09kBOH3U6TSVkWfz; https://www.youtube.com/watch?v=cU8HrO7XuiE, http://blankbanshee.bandcamp.com/album/blank-banshee-0; https://youtu.be/ZS96BuiZDag.

[141] Adam Harper, 'Comment: Vaporwave and the Pop-Art of the Virtual Plaza', *Dummy* (July 12, 2012): http://www.dummymag.com/features/adam-harper-vaporwave.

[142] Key Accelerationist texts include Nick Land, *Fanged Noumena: Collected Writings 1987-2007*, edited by Ray Brassier and Robin Mackay (Falmouth, 2011); Benjamin Noys, *Malign Velocities: Accelerationism and Capitalism* (Winchester, 2013); Robin Mackay, *#ACCELERATE: The Accelerationist Reader* (Falmouth, 2014).

[143] Brackett, *Categorising Sound*.

[144] Kenneth Goldsmith, *Uncreative Writing: Managing Language in the Digital Age* (New York, 2011).

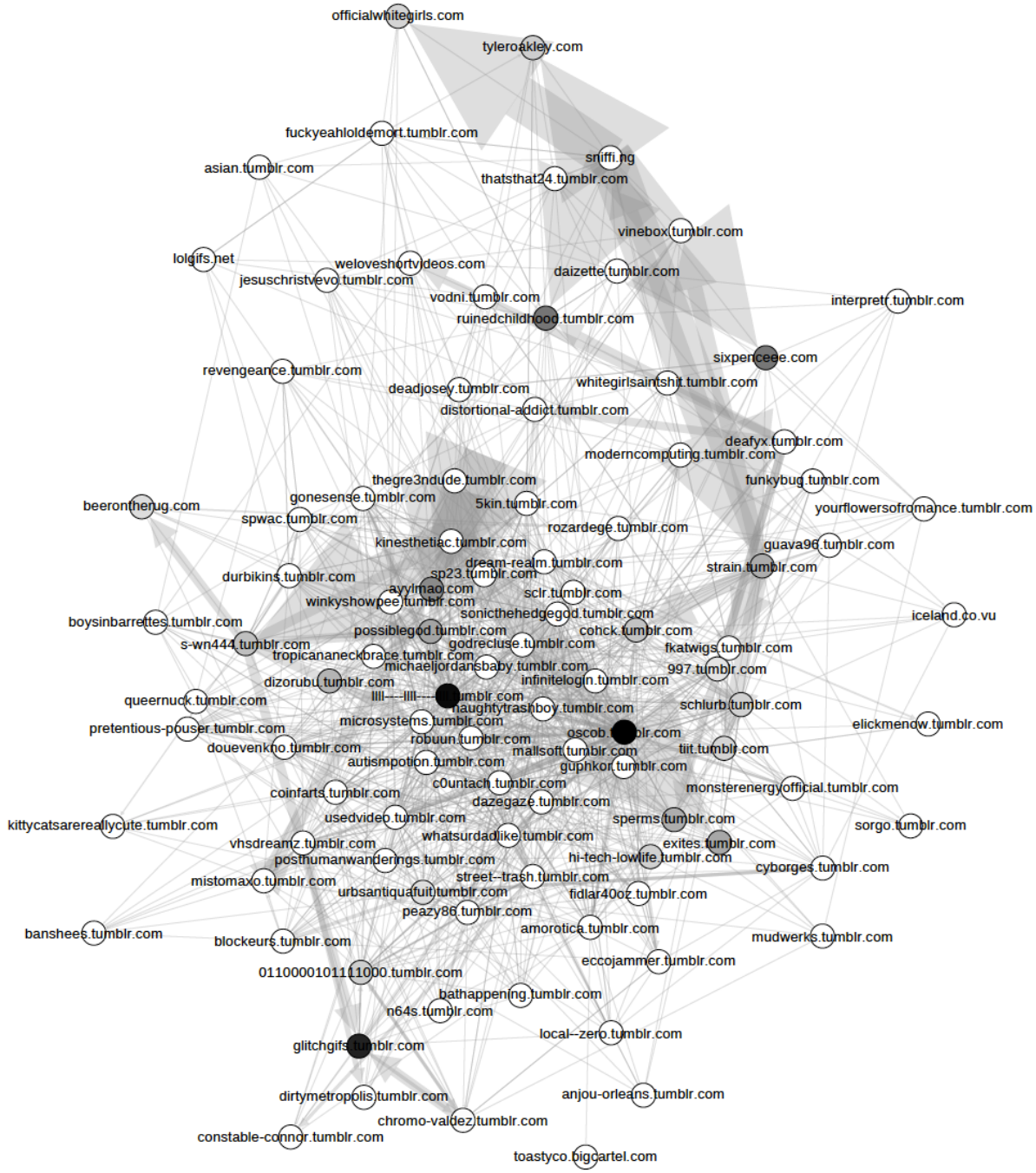


Figure 9: Issue Crawler map for vaporwave

The coherence of the genre is astonishingly clear in the 'gestalt' of the web crawl (Figure 9): all of the 100+ actors that appear in the results subscribe to the same amateur internet-based platform, Tumblr.com.[145] Indeed, the visualisation is an artefact of the idiosyncratic way that the IC software

[145] Inspection of the IC results reveals that the few sites that do not have a tumblr.com suffix are nevertheless Tumblr pages. In the cases of Beer On The Rug and Ladybow, the site owners have paid a fee to register a custom domain name. The favoured use of Tumblr among vaporwave artists and fans suggests a much younger demographic than for the other genres. Although Tumblr's user base is comparatively much smaller than other social networking sites such as Facebook, Twitter and Pinterest (Adweek 2015), for the lucrative age demographic of 16-25 it exceeds all of these sites. See: Adweek, 'Infographic: Who's Really Using Facebook, Twitter, Pinterest, Tumblr and Instagram in 2015' (2015): http://www.adweek.com/news/advertising-branding/new-social-stratosphere-who-using-facebook-twitter-pinterest-tumblr-and-instagram-2015-and-beyond-1622; Cooper Smith, 'Tumblr Offers Advertisers A Major Advantage: Young Users, Who Spend Tons

interacts with the Tumblr architecture. In relation to Tumblr, IC has no way of distinguishing between hyperlinks that are purposefully created by a page owner in order to express a relation, and hyperlinks that are automatically created when a fan or another interested party 'likes' or 'reblogs' the page owner's page. These likes appear on the visualisation as hyperlinks *back* to the Tumblr page of the individual 'liker' or 'reblogger', in effect reversing the phenomenon that IC is intended to portray. Thus, frequent 'likers' appear on the map as though they were prominent actors, while the actor that is 'liked' may not appear at all. What we see in the vaporwave map is therefore an explosion of hyperlinking in the guise of congeries of 'likes' for particular tracks, artists and web pages, these 'likes' bouncing vertiginously between the multitude of pseudonymous subjects that constitute vaporwave's subculture. Certain actors like the Bandcamp-based Beer on the Rug label and popular vaporwave artists—OSCOB, Vektroid and James Ferraro—have strong and enduring 'in-world' lives; yet on the map they barely appear, dwarfed by the pervasive presence of the genre's hyperactive subculture. If featured artists and musicians are appreciated for perfecting the vaporwave aesthetic, participants in the fan subculture mimic this aesthetic, crudely cloning the characteristic kitsch, multimedia, collage-based net art in their Tumblr pages—creating an amateur net art. Indeed, just as fans frenetically 'like' the musicians and labels associated with the genre, so vaporwave artists and labels link to fans' Tumblr pages, affirming that fan art has acquired significant within-scene prestige. All of this testifies, again, to the broadly horizontal nature of the vaporwave subculture and to the fuzzy, permeable border between artists and amateurs. The effect is that the perfect storm of Tumblr linking at the heart of the map pushes other actors—key artists and labels, distribution portals like Soundcloud and Bandcamp—to the edges of the map.[146]

Vaporwave's uniformity, as visualised in the map, signals a profound change in the material mediation of music genres online: it is manifest in a characteristic shift from blogging to Tumblr-based 'microblogging'. For the affordances of the Tumblr platform engender a particular set of cultural practices that contrast markedly with those afforded by Blogger, the platform at the core of hauntology and h-pop. Known for its minimal, cryptic design, Tumblr is especially adapted for the uploading and manipulation of multimedia content—images, GIFs and short videos—rather than discursive text. It affords very quick content update, and allows personalisation of individual web pages, a practice abandoned by corporate-monopoly platforms like Facebook in their deliberate enforcement of a uniform site design. But additional complexity stems from the ways in which vaporwave participants have created a very singular culture of Tumblr use. As Figure 8 shows, a garish collage-based aesthetic abounds in the vaporwave Tumblr practices, comprised of found and recycled digital images and clips—the visual detritus of the commercial online world. Users typically appropriate 'bad art' such as dated computer graphics, GIFs or icons from historical operating systems. Characteristic motifs are the Windows 95 desktop view and interface, visual signifiers from the dial-up era of the net, the amateur web design of the Geocities network,[147] and the recovery of obscure injunctions to 'interact' with the web manager. In this sense, vaporwave participates in a broader 'Tumblr aesthetic' that has become fashionable in recent years among underground digital music and art scenes—for example, in Montreal.[148] In vaporwave this is manifest in a shared absorption in the specific way that

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Of Time On The Site', *Tech Insider* (2013): http://www.techinsider.io/tumblr-and-social-media-demographics-2013-12.

[146] Regarding discursive mediation, the news and entertainment site 'Reddit', used mainly by 18-29 year old males (see Alexis Madrigal, 'Reddit Demographics in One Chart', *The Atlantic* (2013)) was a key forum for discussion and elaboration of vaporwave's aesthetics. Yet it appears nowhere in the map.

[147] Geocities was one of the most popular destinations on the internet in the mid to late 90s. User-built web pages were organised into 'neighbourhoods' based on the nature of the content: 'Area 51' was for Science Fiction and fantasy, 'Hollywood and Hills' was for pages about films and actors, 'Westhollywood' was for gay, lesbian, bisexual and transgender topics. In 2009, Yahoo! announced that the service would close down in Europe, America, and Canada, leaving only Japan with an active Geocities network. See Megan Garber, 'Quiz: GeoCities or Tumblr?', *The Atlantic* (2013): http://www.theatlantic.com/technology/archive/2013/05/quiz-geocities-or-tumblr/276029/. Geocities is regularly discussed on 'Reddit' (previous note), for example on the popular subreddit theme 'retro internet': https://www.reddit.com/r/RetroInternet.

[148] Patrick Valiquet, *'The Digital Is Everywhere': Negotiating the Aesthetics of Digital Mediation in Montreal's Electroacoustic and Sound Art Scenes*. DPhil thesis, University of Oxford (2014), 197.

Tumblr as a platform mediates what is uploaded there, along with a reflexive pursuit and intensification of this very material mediation. The dense and lively interconnections in the vaporwave map therefore indicate how the genre is constituted by an energetic, almost purposeless play with the material and aesthetic affordances of Tumblr.

Vaporwave's intense material and citational reflexivity in relation to the internet amounts to a kind of limit case for our use of IC. Co-link analysis, as we have explained, is a medium-specific technique that both exploits and highlights the web's distinctive affordances. In our adaptation, it analyses hyperlinking to generate a portrait of the mediations in which the online actors for each genre are engaged. The results for vaporwave are heightened inasmuch as the genre is a fully net-immersive phenomenon: the internet has itself become the source of content, as well as the medium for creativity, delivery, communication and sociality. As a genre, vaporwave is partly 'about' the cloud tags, hyperlinks and networks that IC visualises. Moreover, for vaporwave, the IC map does not in general represent subjects, entities and cultural practices that have another existence offline. The pseudonymous avatars—ruinedchildhood.tumblr.com, sonicthehedgegod.tumblr.com, whitegirlsaintshit.tumblr.com, hitechlowlife.tumblr.com—*are* the actors, and the backlinking that appears in the map reflects vaporwave's hectic subcultural production, itself immanent in the vaporwave aesthetic. Indeed, celebrating the anonymity and flux of cyberspace, the monikers of vaporwave's avatars constantly change.[149] It is the heightened capacity for simulation afforded by the internet that vaporwave exploits through its intricate play with the texture of 'virtual life' acted out on Tumblr. These are very different uses of the internet to the previous four genres. Rather than an inflationary cycle of hyperlinking between core actors—musicians, critics, labels—fuelling the mutual accumulation of charisma and prestige, in the vaporwave subculture linking practices have become focal aesthetic signifiers. Visible in the results, for example, are links to improbable entities like the corporate multinational Monster Energy Drink. As well as signalling an ambiguous friendliness to the jock culture of branded sportswear and energy drinks, here the act of linking parodies the 'aspirational' hyperlinking of the *.microsound* page—the parody itself heightening the insubstantial, putatively inauthentic nature of such online 'connections'.

If the previous genres espoused web-specific practices that in each case were broadly coeval with the genre's emergence—microsound and email lists, hauntology and blogging, h-pop and YouTube—then vaporwave's aesthetics are bound up in the historicity and evolving materiality of the internet itself as a medium. Actors associated with the genre return to earlier web-based technologies and practices, particularly those from the mid 1990s to early 2000s, remediating them in new guises. One example is the FTP architecture present earlier in microsound. As we saw, FTP provided microsound musicians with an experimental way to produce digital music collaboratively in a novel format: the 'projects' page. Working separately on a shared soundfile, musicians would serially process and remix the material, and then re-upload it to the server as tracks. By the time of vaporwave's emergence, the FTP architecture on which this practice relied had become more widely available in the form of the cloud-based commercial file-hosting services Rapidshare, Megaupload and MediaFire. Although these services hosted a range of file-types—from text documents to movie files—music was at the centre of a series of controversies that erupted around them. In particular, musicians and labels criticised how use of these platforms had encouraged an online black market for copyrighted music, including the extra-legal sharing of MP3s.[150] In vaporwave, the MediaFire platform is remediated and the reference becomes arch and reflexive, implicitly condoning 'piracy' as the proper condition of online media consumption. Indeed, in keeping with Harper's association of vaporwave with Accelerationism, the embrace of online 'piracy' among vaporwave's adherents appears allied to a deliberately ironic participation in the acceleration of the demise of the 'old' music industry. Vaporwave artists such as

[149] The speed of change is apparent in the fact that many websites visualised in the vaporwave map have rapidly become inactive: a web crawl using the same starting links executed months later reveals almost entirely different actors.

[150] The US government accused Megaupload's founders of presiding over 'massive' online piracy, as well as racketeering and money laundering. Its operations were closed down on January 19 2012. See Matt Williams, 'US Government Hits Megaupload with Mega Piracy Indictment', *The Guardian* (January 19, 2012).

MediaFired™ are notorious for sharing whole albums of original material through these services; as with the general practice of anonymous uploading, albums are invariably shared as zipped folders bearing little more than an album title and artist name. Attesting further to this political project is the absence of even the smallest of labels or distributors from the vaporwave map, suggesting that the genre operates mainly through non-monetised networks of online exchange, with occasional Bandcamp links being the sole exception. This 'return' by the vaporwave subculture to the cheapest, most overcrowded online platforms for the storage and exchange of music is in part, then, an act of reclamation: Rapidshare and Megaupload are *détourned* in their remediation, becoming a parody of the 'legitimate' channels for experimental music provided by the FTP architecture for microsound.

The efforts of vaporwave's subculture to orchestrate an arch but subversive underground, one that is almost parodic of an 'underground', entirely within the crowded channels of the internet is in stark contrast to the earlier genres. At the heart of vaporwave is an ambitious and heightened, aestheticised engagement with music's material mediation in the guise of the internet—evident in its significantly more reflexive and nuanced understanding of the net itself as an evolving creative medium. Indeed, the genre engages consciously with the very historicity of the net, a register completely absent from the previous genres. This orientation is clear in the visible attempts in the Tumblr practices to remediate earlier and current web practices, interfaces and screen aesthetics—some of them associated with the era designated 'web 1.0'. It is the sense of there being discernible 'epochs' of internet history influencing the texture of life online that vaporwave explores and celebrates by installing surreal, anachronistic net-based cultural practices at the core of its aesthetic economy.

The vaporwave assemblage accentuates, finally, the forms of social mediation characterising the genres analysed in this article. On the one hand, the IC results point to a highly developed, internet-mediated equivalent of the (first plane) socialities of musical practice apparent in the frenetic Tumblr-based creativity emblematic of the genre's subculture—an incessant, viral, time-shifted and distributed collective play. On the other hand, fuelled by the affective contagion engendered by this aesthetic play, vaporwave's subculture exemplifies the online genesis of a (second plane) musically-imagined community—music's powers to create aggregations of the affected.[151] As in microsound, the two planes are entangled: participatory creative practices and affective public are combined online. In vaporwave, however, the collective musical affect is fused with a technological-aesthetic political project aimed at intervening, reflexively and subversively, in the evolving cultures of the internet. With its stylisation of 'participation' and 'community', and its purposeful reduction of genre to reification, stasis and memes, vaporwave queries and empties out the future-oriented processual temporalities apparently immanent in both the internet and genre.

Conclusions: Music, place and time after the internet

Through ethnographic and historical research on five significant music genres, in conjunction with use of the Issue Crawler software, we have traced the diverse ways in which both the constitution and the identity of music genres have been complexified online. We have highlighted how, in addition to their characteristic sonic properties, a constellation of distinctive non-sonic mediations—discursive, visual, social, material and technological—characterises each genre. Moreover, through the nostalgia genre continuum, we have shown how a sense of transition between closely related genres can be produced by changes that in some instances are less to do with musical sound and more with such non-sonic mediations. Across the five genres we have shown how IC is an effective tool in support of the analysis of genre in music as an assemblage of mediations, now extended to encompass the internet's mediation of such genres—where the internet is conceived as an evolving technological environment and a multiplicity. In this conclusion we want to clarify and extend our analysis in two directions—with reference to place and time.

Before this, we offer two comments on the experiment with IC at the core of this article. First, we acknowledge the recursive nature of the exercise in which we are engaged: for each genre's hyperlink

[151] Born, 'Music and the Materialization of Identities', 379.

ecology is a mediation of the online and hybrid online-offline actors associated with the genre, while the IC visualisation of these hyperlink ecologies amounts to a further mediation. We have presented, then, an interpretation of a mediation (IC) of mediations (hyperlink ecologies) of online and online-offline actors participating in the five chosen genres—actors who are generating through their practices the genres' characteristic mediations. This dense layering of mediation signals the burgeoning complexity facing those developing new research methods for the digital humanities, including digital musicology.

In addition, it is important to recognise that the IC software is now just one among a growing array of digital methods that can be brought to the analysis of music's mediation by the internet. IC is certainly marked by the era of its emergence: it derives from the period of ascendance of hyperlinking, when individual web sites would host a curated 'links page' listing favoured destinations on the web. Today, the creation of discursivity and socialities online takes place largely inside commercial social media platforms, often closed communities or 'walled gardens' in which music, information and any other data shared are only visible and accessible to participants' commercially-mediated 'social networks'. As vaporwave showed, commercial platforms like Tumblr can assume such dominance among participants that there remains almost no 'outside': the platform is equated with the web itself. Platform-specific digital methods are therefore required to probe music's mediation by social media—some of which already exist (e.g. Netvizz, Twitter Capture, Analysis Toolset, Instagram Scraper), while others are yet to be developed. At the same time, IC has uses for genre analysis beyond those we have presented. Running the IC software regularly at intervals, for example, would make it possible to track the nature and pace of change in hyperlinking practices within a single evolving genre.

In terms of place: popular music scholars and (ethno)musicologists have long emphasised the need to understand the 'place' of musical practices through the complex articulations between the physical and/or geographical locations in which they unfold and the imaginary figurations of place produced by techniques of musical signification.[152] The prominent role of the internet in the five genres examined might lead one to assume the erosion of place as a meaningful term because of the internet's association with globality, its manifestation of virtual equivalents of Augé's 'non-places' or Baudrillard's 'hyperreality'.[153] The analysis presented, however, weighs against such an assumption, pointing, perhaps surprisingly, to the resilient significance of 'place' in the five genres.[154] This is apparent in the relations set up in each genre between the imaginary figurations of place conjured up by particular sounds, images, discourses and technologies and the actual physical distribution of the genres, as indicated by the domain name suffixes present in the IC maps (.jp, .co.uk, .de, .fr and so on). What does emerge, however, is how internet mediation appears to intensify the potential for tensions or slippage *between* music's imagined place and physical location.

In this light, the 'place' of microsound is strikingly unified: it is the most transnational of the genres, with Japanese, American, Canadian, British, German, French and Spanish suffixes, its 'global' reach evident in its diffusion via the international digital arts festival and gallery circuits. And this is

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[152] See, inter alia, Straw, Will. 'Systems of Articulation, Logics of Change'; Barry Shank, *Dissonant Identities: The Rock'n'Roll Scene in Austin, Texas* (Hanover, NH, 1994); Martin Stokes (ed.), *Ethnicity, Identity and Music: The Musical Construction of Place* (Oxford, 1997); Andrew Leyshon, David Matless and George Revill (eds.), *The Place of Music* (London, 1998); Georgina Born and David Hesmondhalgh (eds.), *Western Music and its Others: Difference, Representation, and Appropriation in Music* (Berkeley, CA, 2000); Daniel Grimley, *Grieg: Music, Landscape and Norwegian Identity* (Woodbridge, 2006).

[153] Marc Augé, *Non-Places: Introduction to an Anthropology of Supermodernity* (London, 1995); Jean Baudrillard, *Jean Baudrillard: Selected Writings*, edited by Mark Poster, translated by Jacques Mourrain. (Stanford, CA, 2002). The capacity of the internet to 'strengthen our relationship with global culture' is regularly cited as a reason to engage with network and telematics musics; see for example Oliveros et al. 'Telematic Music: Six Perspectives', 95–96.

[154] In this we lend support to the findings of Allington et al, 'Networks of Value in Electronic Music', who, in their analysis of valuing practices in 'location agnostic' online networks amongst dance music producers, show that the 'metropolitan emplacedeness' of dance music, centred around such global cities as London, New York, Chicago and Paris, remains characteristic of, and is even intensified by, uses of the internet.

matched by the genre's transnational modernist musical imaginary. In contrast, both hauntology and chillwave manifest a characteristic slippage. The American-west-coast imaginary conjured up by chillwave's musical sounds, discourse and style exists in tension with the genre's transnational geographical scope, shown by Italian, Dutch, Finnish, Swedish, British, American and Australian suffixes, nearly all of them associated with mainstream international pop intermediaries. In turn, the nostalgic British national imaginary figured by hauntology is articulated with a largely Anglo-American set of suffixes; indeed, the Anglo-American geographical scope of both hauntology and h-pop speaks to how these genres inherit the particular transnationalism characteristic of pre-internet indie/alternative scenes.[155] Vaporwave exhibits yet another articulation: while its audiovisual imaginary gleefully mines 'global' and 'non-place' signifiers, along with exoticist, even Orientalist images of East Asia,[156] the genre is squarely Anglo-American in terms of the domain name location of the majority of its subcultural participants.

Two observations follow. On the one hand, it is remarkable how richly and fruitfully these internet-mediated genres mine the aesthetic, ideological and symbolic valencies either of 'place' or of 'globality'. On the other hand, given assumptions about the internet's disintermediating capacity to expand music's circulation beyond the limits of offline physical distribution, it is striking how the internet's mediation of certain genres appears to result in a reproduction of the geographical distribution of their pre-internet precursors (microsound's transnational modernism; hauntology's and h-pop's indie Anglo-Americanism)—a tentative observation that requires further research.[157] These findings suggest that, musically and culturally, any claim that the internet and its presumed 'globalising' tendencies are now 'less about territorial boundaries and [nation] states and more about connection and flow'[158] should be met with caution. A reconfiguration of both imaginary and physical music geographies, and of their articulation, certainly, along with the potential for heightened vectors of musical exoticism and other musically-fuelled, fantasised identifications;[159] but no mere dissolution into 'flow'.

In addressing music's mediation by the internet, we have also necessarily drawn attention to time: to the historicity of, and the temporalities produced by, the five music genres as well as the internet and its changing cultures of use.[160] These are challenges neglected by previous uses of IC and similar digital methods, and they are in tension with the present emphasis on contemporaneity and 'liveness' in digital social research.[161] Our analysis of the five genres identifies two critically important, and related, dimensions of temporality. First, how the identities of the genres can only be grasped by

[155] The Anglo-American dominance of indie and alternative scenes is a complex matter. Suffice it to note that the dominance of the British music press (for example, the London-based *The Wire* magazine), as well as the impact of British indie labels (eg Creation, One Little Indian, 4AD), record stores (Rough Trade), and festivals (Glastonbury) have secured Britain's lasting international influence. See Simon Frith, 'Anglo-America and Its Discontents', *Cultural Studies*, 5, 3 (1991), 263-269, for a broad discussion of the Anglo-Americanism of popular music and rock.

[156] Vaporwave's key exegete Harper situates the genre in what he calls 'the Virtual Plaza': Harper, 'Comment'.

[157] We acknowledge that attributing too much significance to suffixes is problematic. The most widely used domain name (.com) is international, while .us, the official United States domain name, is rarely used. Moreover, proprietary social networks make it impossible to read location from a domain name; and while users of Tumblr.com are predominantly based in the US (48%), the actual geographical location of its users is only publicly known if this information is shared in the 'about me' section. A fuller analysis of the physical location of actors linked to specific genres is beyond the scope of this article; to achieve this, platform-specific tools such as Netvizz, Twitter Capture, Analysis Toolset and Instagram Scraper would have to be deployed.

[158] Law, John, and John Urry. 'Enacting the Social', *Economy and Society*, 33, 3 (2004), 403.

[159] On the fantasised identifications afforded by music, among them varieties of exoticism, see Georgina Born and David Hesmondhalgh, 'Introduction', in Born and Hesmondhalgh (eds.), *Western Music and Its Others*, 1–58, especially 'Music and the Representation/Articulation of Sociocultural Identities' (31-37) which notes how music can work 'to create a purely imaginary identification… with no intent to actualize those identities' (35).

[160] These methodological directions are further developed in Georgina Born, 'Making Time: Temporality, History, and the Cultural Object', *New Literary History*, 46, 3 (2015), 361-386.

[161] See, for example, Celia Lury, 'Going Live: Towards an Amphibious Sociology', *The Sociological Review*, 60 (2012), 184–97.

tracing their temporal interrelations—as the nostalgia genres react against the modernist sounds and technological imaginaries of microsound and similar genres, and as the transient, permeable identity of hypnagogic pop bifurcates into the mainstream chillwave and the underground vaporwave. And second, in the reflexive way that time is itself figured aesthetically, materially and symbolically in the genres' sonic, audiovisual, technological and discursive mediations—in microsound's microtemporal modelling of timbre, or the nostalgia genres' fetishistic return to obsolete sound media and cultural icons.

Regarding the internet, this study supports theoretical calls to bring the historicity of and temporalities produced by distinctive media into the conceptual and methodological armoury of the digital humanities.[162] Indeed, in the context of the relentless flux and churn of internet technologies, we traced the co-evolution of the five genres along with the particular cultures of internet use associated with them, pointing to a growing reflexivity towards the internet's history and aesthetic propensities among musicians, critics, fans and others. If the identities of the four nostalgia genres have been taken by commentators to be a response to an internet-based cultural archive[163] or 'digital afterlife',[164] then vaporwave—with its parodic, meta-reflexive engagement with earlier internet practices, platforms and interface aesthetics—plunders the historicity of the internet itself, now rendered as a historical medium or cultural form like any other.

Addressing the historicity of the internet through the evolving cultures of its use invites us to hold our analysis up against two established periodisations: Tim O'Reilly's distinction between 'web 1.0' and 'web 2.0',[165] and that between 'digital' and 'post-digital' cultures derived from the writings of Nicholas Negroponte and brought to music by Kim Cascone.[166] The shift from web 1.0 to 2.0 is taken to signal a move from the web as a one-way information portal eliciting relatively passive uses to the web as a two-way participatory medium in which users actively supply content, exemplified by sites like Wikipedia and Youtube. Post-digital theorists also identify two phases that are in part associated with the internet, and as with the retrospective concept of web 1.0, the digital has often been a retrospective designation made from the perspective of a subsequent condition—the post-digital. The digital is taken to summarise a period driven by teleological ideologies and imaginaries of technological progress associated with a movement 'towards "perfect" representation…, towards "transparency" and… towards more powerful illusion'.[167] In reaction, the post-digital is taken to register manifold objections to and disillusionments with these ideologies; in music, it was associated from the late 90s with the online circulation of 'deconstructive audio visual techniques'[168] and the aesthetic exploration by a generation of nonacademic computer musicians of error, distortion, breakdown and malfunction, enacting a break with the 'metaphysics of digital immateriality'.[169]

Such periodisations are, however, productively muddied by the genres we have discussed. In several ways they defy any neat boundary between web 1.0 and 2.0. If microsound, a pre-internet form that migrated online in the early 90s, appears akin to web 1.0, the participatory engagement afforded by its email list and forum come closer to web 2.0. And if vaporwave's frenetic subcultural production practices exemplify the 'user-generated content' paradigm of web 2.0, the actual contents produced amount often to ironic simulations of the 'one-way', 'passive' practices of web 1.0. Any putative

[162] Born, 'Making Time', 380.
[163] Reynolds, *Retromania*; Mark Fisher, 'The Metaphysics of Crackle: Afrofuturism and Hauntology', *Dancecult: Journal of Electronic Dance Music Culture*, 5, 2 (2013), 42–55; Elodie Roy, 'All the Memory in the World, All the Music in the World: Mediating Musical Patrimony in the Digital Age', *Networking Knowledge: Journal of the MeCCSA Postgraduate Network*, 7, 2 (2014), 20-33.
[164] Nicola Wright, 'Death and the Internet: The Implications of the Digital Afterlife', *First Monday*, 19, 6 (2014).
[165] O'Reilly, *What Is Web 2.0?*
[166] Nicholas Negroponte, 'Beyond Digital', *Wired Magazine*, 6, 12 (1998); Cascone, 'The Aesthetics of Failure'.
[167] Ian Andrews, 'Post-Digital Aesthetics and the Return to Modernism' (2002): http://www.ian-andrews.org/texts/postdig.html.
[168] Cascone, 'The Aesthetics of Failure', 12.
[169] Steven E. Jones, *The Emergence of the Digital Humanities* (London, 2013), 81.

distinction between the digital and post-digital is similarly problematised; indeed, despite the significant aesthetic differences between microsound and the nostalgia genres, all have at one time or another been labelled 'post digital'. As Florian Cramer notes, the confusion stems from the fact that glitch and microsound enact their politics from 'within' the digital, to the extent that they are resolutely medium-specific, while the nostalgia genres do so from 'without', through the defiant use and revalorisation of pre-digital technologies like analogue synthesizers, VHS and cassette tapes.[170] Once again, vaporwave is exceptional for its knowing play with any notion that such 'epochs' of internet time are discernible, enacted both in its parodic return to signifiers of web 1.0 and in its retrospective, excessive embrace of the very ideology of the 'digital' that microsound and glitch set out to deconstruct.[171] While our analysis of the trajectories that can be traced between the five genres is emblematic of profound transformations in the cultures of internet use—as they are refracted through changing music genres—such transformations trouble, and cannot be captured in, the dualistic terms of the existing periodisations. The research we have presented therefore requires the development of new concepts attuned to the highly reflexive and recursive temporal and historical processes described.

A key instance of this temporal recursivity—referencing yet a further periodisation—is the current fate of the twentieth century concepts of modernism and postmodernism as they return in association with internet-based musics: modernism for microsound and other genres,[172] postmodernism for the four nostalgia genres.[173] In the writings of Fredric Jameson and others on modernism and postmodernism in the 1980s, the historical relation between the two was conceived of in terms of a linear temporal succession. 'Let us stress again the enormity of a transition which leaves behind it the desolation of Hopper's buildings…, replacing them with the extraordinary surfaces of the photorealist cityscape, where even the automobile wrecks gleam with some new hallucinatory splendour', Jameson writes in the effort to encapsulate the 'newer cultural experience' of postmodernism.[174] In parallel, his diagnosis of the 'cultural logic' of postmodernism centres on a fundamental change in the *quality* of time, a 'waning of the great high-modernist thematics of time and temporality': a turn to the synchronic from the diachronic, to 'categories of space from categories of time'.[175] The attendant 'crisis of historicity' engenders a loss of capacity to organise 'past and future into coherent experience', such that cultural production transits into a 'practice of the randomly heterogeneous and fragmentary and the aleatory'.[176] Collage and pastiche, rather than parody, become culturally dominant; postmodern cultural production has 'nowhere to turn but to the past: the imitation of dead styles… stored up in the imaginary museum of a now global culture'.[177]

Against the background of Jameson's analysis, the question arises: what is it to invoke these periodising categories today in relation to genres like microsound, hauntology or vaporwave? In marked contrast to earlier theorists, current invocations of the terms by writers commenting on the five genres we have addressed largely employ them shorn of their historical referents and of the linear conception of history they embody. Instead, modernism and postmodernism are dehistoricised; indeed,

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[170] Florian Cramer, 'What Is "Post-Digital"?', in David M. Berry and Michael Dieter (eds.), *Postdigital Aesthetics: Art, Computation and Design* (London, 2015), 12–26.
[171] In commentaries on internet genres like vaporwave, a further technological periodisation is emerging: post-internet. Coined by Gene McHugh to describe art that thinks 'in the fashion of the network', its utility as a critical concept is yet to be determined: see Gene McHugh, *Post Internet* (Lulu.com, 2011); Karen Archey and Robin Peckham, 'Art Post-Internet | UCCA' (2014): http://ucca.org.cn/en/exhibition/art-post-internet/.
[172] Christoph Cox, 'Return to Form : Christoph Cox on Neo-Modernist Sound Art', *Artforum* (November 2003); Demers, *Listening Through the Noise*; and for an alternative dehistoricised, formalist application of modernism to music today, see Adam Harper, *Infinite Music: Imagining the Next Millennium of Human Music-Making* (Winchester, 2011).
[173] Stephen Graham, '(Un)Popular Avant-Gardes: Underground Popular Music and the Avant-Garde', *Perspectives of New Music*, 48, 2 (2010), 5–20; Reynolds, *Retromania*; Fisher, *Ghosts of My Life.*
[174] Fredric Jameson, *Postmodernism, or The Cultural Logic of Late Capitalism* (Durham, NC, 1991), 76.
[175] Ibid., 64.
[176] Ibid., 71.
[177] Ibid., 65.

their juxtaposition is assumed. In critical writings associated with the five genres, modernism and postmodernism become descriptors detached from wider historical conditions, in this way demanding that we analyse, in Reinhart Koselleck's terms, the ways in which the semantic resonances of such epochal concepts get reworked in new aesthetic, material and social conditions.[178] One response to this state of affairs—to the abandonment of a belief in modernism's historical 'contract with the future', and in postmodernism as simultaneously the continuation and negation of that historical project—has been the invention by art theorists of the concept of the 'contemporary'. In Peter Osborne's words, the contemporary emerged in the last decade with the 'discrediting of postmodernism as a coherent critical concept';[179] contemporaneousness is the modern shorn of its 'contract with the future'.[180]

In terms of the substantive qualities of 'postmodern' time today, as evinced by the nostalgia genres, further significant differences from the historical usage are palpable. If the 'imitation of dead styles' drawn from a 'global culture' is rampant, stoked by the internet as archive, it is also true that collage, pastiche and the 'randomly heterogeneous' now coexist with biting irony and parody, as we have shown for vaporwave. Moreover, rather than signalling a general 'crisis of historicity', in some cases the recycling of cultural materials serves the insistent and affective summoning of earlier cultural epochs, and with great specificity: in hauntology, the (re)animation of public cultural 'memories' of a popular modernism allied to a political imaginary—the revivification of a lost social democratic project;[181] while in chillwave and hypnagogic pop, such a public political project gives way to more personalised consumer-culture referents. The complexity of historicities and temporalities at work in these internet-mediated musical and cultural practices attached to the current invocations of modernism and postmodernism renders the linear dualism and historical realism of the earlier periodisation in need of urgent revision. Such practices generate forms of music and culture which demand that attention be paid to the reflexive significance attributed by musicians and critics today to modernism and postmodernism as concepts, as well as the unprecedented uses being made of these earlier epochal terms. Although it may be problematic that present returns to these concepts sometimes appear uninformed by their consequential historical referents, the array of subtle engagements with musical and cultural histories shown by the five genres leads us to expect that alternative periodisations will emerge to unpack what is now being bundled under the 'contemporary'—what will and must come 'after the post-'. Tackling the historical dynamics of recent music genres therefore requires that we acknowledge the part played in them by intensely reflexive engagements with concepts of historical time—'concepts that form part of the calculative agency of [musicians and] artists and that supervise the creation of any cultural object'.[182] These challenges affirm the methodological orientation proposed in this article: that the analysis of internet-mediated music genres necessitates interdisciplinary approaches that integrate digital methods with both ethnography and history, in order to generate periodisations adequate for the post-internet musical present.

[178] Reinhart Koselleck, *The Practice of Conceptual History* (Stanford, CA, 2002).
[179] Peter Osborne, *Anywhere or Not at All: Philosophy of Contemporary Art* (London, 2013), 17.
[180] Terry Smith, 'Contemporary Art and Contemporaneity', *Critical Inquiry*, 32, 4 (2006), 681–707, 703.
[181] Hatherley, 'Lash Out and Cover Up'; Fisher, *Ghosts of my Life.*
[182] Georgina Born, 'The Social and the Aesthetic: For a Post-Bourdieuian Theory of Cultural Production', *Cultural Sociology*, 4, 2 (2010), 1-38, 26.