Title	Insider or outsider? Exploring some digital challenges in ethnomusicology
Author(s)	Egan, Patrick
Publication date	2021-10-12
Original citation	Egan (Pádraig Mac Aodhgáin), P. (2021) 'Insider or outsider? Exploring some digital challenges in ethnomusicology', Interdisciplinary Science Reviews, 46(4), pp. 477–500. doi: 10.1080/03080188.2021.1872144.
Type of publication	Article (peer-reviewed)
Link to publisher's version	https://www.tandfonline.com/doi/full/10.1080/03080188.2021.1872144 http://dx.doi.org/10.1080/03080188.2021.1872144 Access to the full text of the published version may require a subscription.
Rights	© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. http://creativecommons.org/licenses/by/4.0/
Item downloaded from	http://hdl.handle.net/10468/12592

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Insider or outsider? Exploring some digital challenges in ethnomusicology

Patrick Egan (Pádraig Mac Aodhgáin)

Published online: 12 Oct 2021.

Submit your article to this journal ⍐

Article views: 670

View related articles ⍐

View Crossmark data ⍐

IoM³
The Institute of Materials,
Minerals and Mining

Routledge
Taylor & Francis Group

Insider or outsider? Exploring some digital challenges in ethnomusicology

Patrick Egan (Pádraig Mac Aodhgáin)[a,b]

aUniversity College Cork, Cork, Ireland; bDepartment of Digital Humanities, University College Cork, Cork, Ireland

ABSTRACT

This paper considers debates that have taken place in ethnomusicology as a result of engagement with the classification of data. Landmark projects over the past century introduced various classification systems and initiated important debates within the field. From the author's perspective, classification of data is understood as a necessary precursor to computation in these projects. Classificatory thinking is used here as a theme to explore debates that have arisen when abstractions of musical practice have been suggested for use with ethnomusicology. The paper proposes that a recent approach to research practice for embedding computation adds to ongoing interdisciplinary work, demonstrating novel ways of contextualizing archival materials with ethnography alongside computation. The approach attempted to strike a balance for engaging large amounts of data in ethnomusicology. The paper argues that some resulting tensions arising from classification lead to insights, which cannot be drawn by ethnomusicological methods alone.

Introduction

This article will consider some debates that have played out when large amounts of data have been engaged by researchers in ethnomusicology, where the use of classification has been suggested as an approach to research practice. Ethnomusicology can be defined as a branch of the human sciences that is focused on music in its social–cultural contexts, especially the ways in which people interact through shared musical experience and discourse about music. The focus on a most recent example, the Seán Ó Riada Collection (SÓRC) Project at University College Cork (UCC) located in Ireland, adds to ongoing interdisciplinary work on classification. Seán Ó Riada became an important Irish composer, arranger, musician, bandleader, filmmaker, broadcaster, raconteur, lecturer and writer, who rose to national prominence

during the mid-1960s. The project was a historical PhD investigation that revealed previously hidden details concerning the musical practices of Ó Riada and his contemporaries. The project proposed ways for embedding computation in ethnomusicology with the classification of music-related projects over time.[1]

The SÓRC archive became the focus of this project, as it contains a large number of manuscript musical scores created by Seán Ó Riada and his contemporaries, in addition to hundreds of documents pertaining to music projects in the English and Irish languages, produced in a wide range of mediums. As a wide-ranging resource, it presented a unique opportunity for studying Irish musical practice. A 300-page thematic digital finding aid accompanies the collection in keyword-searchable portable document format (PDF) allowing metadata regarding music-related documents to be retrieved (Figure 1).

Archivists described this diversity of artistic output in rich detail using the General International Standard for Archival Description (ISAD(G)) archiving standard and the archive was catalogued in 2005.[2] The order of classification presented a number of challenges to the music researcher, as not all music documents were arranged together, but lay dispersed between archival boxes across the Collection. The principal aim of the SÓRC Project then became to recombine and re-contextualize all the artist's music-related projects using the Collection, its digital finding aid and evidence from other archives throughout Ireland. A key aspect of the investigative aims lay in re-combining, re-structuring and re-presenting the wide range of metadata descriptions into datasets and visualizing the data within a digital prototype.[3]

Projects such as these, which necessitate the contextualization of a large amount of digital data, are becoming more prevalent in today's ethnomusicology. As illustrated throughout this article, debates continue to arise when certain types of experimental activity are attempted in the field. As will be described, these approaches can lead to powerful research insights during the course of a research project, but in some ways, the soundness of their contribution to research can be problematic when results are communicated. This article then can be read more broadly as an exploration of both how classification is engaged and communicated.

---

[1]The term 'computation' refers to computationally engaged research and work in the field of Digital Humanities or The Digital Humanities. Much research on the Seán Ó Riada Project was conducted in the Department of Digital Arts and Humanities at University College Cork in Ireland. However, historical projects mentioned in this article existed before this area of research emerged. Since the meaning of digital humanities is also a contested issue within the academy and computing is more definitive, I will use the broader term 'computation' to broadly focus on digital humanities practice in this article.

[2]The ISAD(G) standard is a consistent international framework for organizing archival data. It is employed by archivists to allow interoperability and logical description to be used when detailing the collections of corporations and individuals. It utilizes a classification scheme in arranging and describing documents from general to specific terms, in a thematic fashion.

[3]This digital prototype was referred to as a 'Digital Visualisation Framework' within the PhD thesis. Framework was used as it referred to an interactive version of data visualization software.

411   undated

> File of items relating to 'An Saol Gaelach'. This file includes: part of a galley
> proof of 'An Saol Gaelach'; lyrics of a song 'Seán a bhríste leathair' torn from
> a book; lyrics of a song 'An Cailín Deas Donn'; a pencil draft of an article in
> Ó Riada's hand entitled 'Amhrán Chois Leamhna', possibly a draft of a script
> for a radio broadcast; article in Fionán Mac Coluim's hand titled 'An
> Seanndacht. / Na Ceiltigh ró-tughtha do Coga!'; copy of a circular letter from
> S[ ] Ó Duileagáin of the Folklore Commission seeking help with a detailed
> search for old Irish songs; some pages (1, 2, 5 and 6) of *An tUltach*, October
> 1940.

6 items

Figure 1. Item #411 BL/PP/OR demonstrates the complexity of item-level description of the SÓRC's digital finding aid.

Firstly, I provide a broad outline of the status of computation in ethnomusicology and the SÓRC Project in further detail. I then describe the SÓRC Project and consider three historical example projects that relate to the theme of classification, situating classification as a required activity for computation to occur.[4] This section illustrates debates on how classificatory thinking has been negotiated and appraised within the discipline. I then sketch a brief outline of historical ethnomusicology and computation. My interest here is to illustrate how research on history in ethnomusicology has paved the way for an emerging research environment now conditioned for more nuanced engagement with computation. Finally, I present an evaluation of the SÓRC Project, describing its significance for historical, event-based investigation in ethnomusicology.

Computation in ethnomusicology

There has been renewed engagement with computation in ethnomusicology in recent years. The emerging branches of Music Information Retrieval (MIR) and Computational Ethnomusicology are areas of interdisciplinary science that focus on the use of computing for extracting musical information from digital data. Their application in ethnomusicology and archives is growing and recently indicating new uses for computation in research such as machine learning. The benefits of using computation with event-based research and fieldwork data are also emerging. For example, recent studies have explored the significance of gesture in audio and audio-visual material, such as Adam Clayton's advances on the concept of entrainment (Clayton 2008). Ethnomusicologists have more recently included computing for explorations of digital

---

[4]This holds true for the historical examples mentioned. However, current computational activity such as machine learning approaches may not require classification for computation to occur.

ethnography (Wood 2008; Hsu 2011). This deeper engagement with interdisciplinary approaches demonstrates commitments to computation in research on a theoretical and practical level.

The Seán Ó Riada project

The Seán Ó Riada project presented an excellent case study for exploring computation and fundamental questions relating to classification in ethnomusicology. The project aimed to arrange and contextualize metadata relating to musical practice by mapping music projects over the period of their creation and their performance using a range of historical sources (see https://oriada.o-em.org). In this section, I describe the process of classifying and the possibilities that were afforded by engaging with this data. This example presents a novel approach to developing a better understanding of research practice with classification, adding to the methodology for performance-based investigations.

In the SÓRC Project, a strategy was developed for understanding aspects of Seán Ó Riada's rise to prominence, based on how what is called a 'Digital Visualisation Framework' could bring time-based data together to contextualize musical practice. This strategy was fully integrated with practice theory. A review of the literature indicated that many attempts were made by previous scholars, such as a biography by Ó Canainn, to map Ó Riada's published materials and their dates of production (Egan 2019). Thus, the prototype model of the SÓRC Project was used to gain a more holistic view of the artist's career. It was posited that the process of adding data would lead to exposing serendipitous connections between datasets and unexpected patterns in data, such as projects that happened simultaneously.

In the initial planning stage, a wireframe sketch (Figure 2) was created to develop ideas for imagining an immersive computational interface that would combine the contents of the Collection over time.

This initial sketch demonstrated a design for visualizing the available data to reconstruct inter-related events from the historical period in question. By suggesting interactive possibility between disparate data that were available from a range of sources, it postulated how archival materials might demonstrate the ways that material had originally arrived over time. During interaction with the prototype, letters would have been viewed as the researcher scrolled through a timeline at the bottom of the screen. Each data point on the timeline could have revealed a musical score that would also pinpoint the dates and intervals relating to music composition or performance. Life events would be encountered along this timeline, which would have then corresponded to the arrival of letters. The publication of books that were in Ó Riada's library would have signalled the approximate dates where Seán Ó Riada would have had access to contemporary literature at the time. Data concerning music-related projects
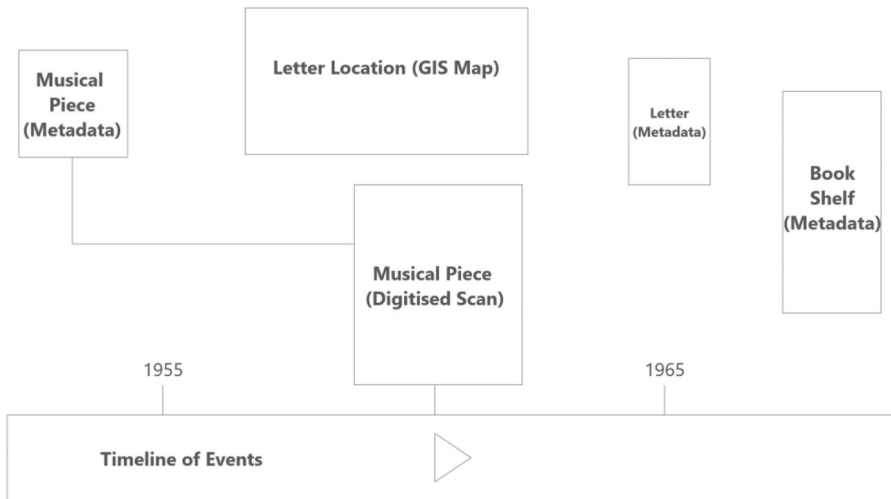
Figure 2. Wireframe sketch of SÓRC Project Digital Visualisation Framework, a simplified version of a design that accommodated various datasets of material from the SORC.

would have connected with data from letters sent to Ó Riada, and other possibilities could have been produced by the presence of data concerning life events.

In attempting to realize this interface (later termed a Digital Visualisation Framework), an iterative process was engaged to add and then insert data into datasets on a continual basis as research progressed. Figure 3 demonstrates how results were visualized and the iterations that were necessary during the development of the prototype model and the acquisition of data.
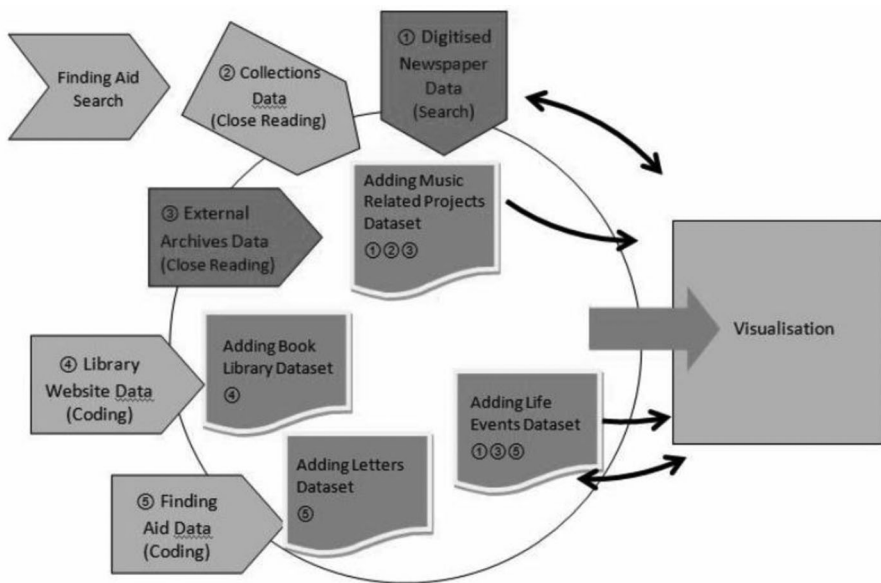
Figure 3. Diagram representing the gathering of data and datasets for digital visualization

Figure 3 demonstrates the process of attempting to locate all examples of Ó Riada's music-related projects within several archives, both digital and non-digital. An API (Application Programming Interface) service was then developed in order to allow data to be retrieved in JSON (JavaScript Object Notation) format. Sources that were consulted only once (2, 4 and 5) are highlighted on the left-hand side. Sources 1 and 3, however, were referred to on a continual basis throughout data gathering. Each data set constituted segments of other data sets as determined using software or coding (see numbers 4 and 5). In other cases, however, the manual entry of data was the primary operation for creating the dataset (see numbers 1, 2 and 3). Data were converted from Irish language sources for visualization of English language addresses in letters. As music-related projects did not exceed 2000 records in the resultant Projects data set, it was possible to become familiar, or one might say *immersed*, with each project during the research process.

Visualization of these data was achieved using the JavaScript library D3.js, allowing a high level of customization to be achieved during coding. This flexibility enabled the goals of the design to be realized, as collecting and structuring the metadata (data that describe data) introduced complexity when new data about projects and events were discovered. For example, upon discovering multiple projects that occurred over the same period, it became necessary to account for projects that were carried out simultaneously. Developing a tracks method (a way of positioning events using computer code by calculating positions of data points and intervals before drawing the result) helped to alleviate this problem, which automatically stacked projects as they were drawn on the visualization.[5] Each iteration of the prototype model was then updated as new data that were discovered and added to the data sets.

This continual experimentation, immersion and interaction with data through developing timeline prototypes and datasets aided in understanding each event, but it also revealed insightful limitations relating to the digital model as the research progressed. As data were gathered and added to data sets, it was necessary to form (and continually reform) items, interval lengths, and to categorize each music project. For example, categorizing the medium of production was a key concern for the SÓRC Project, such as times where Seán Ó Riada as playwright included both writing and musical composition. As a result of this approach, where Seán Ó Riada had assumed more than one role within a musical project, relevant areas of the prototype were redesigned (see Figure 4).

---

[5]The tracks system is based on Reinhart Engel's 'Timeline for d3 – proof-of-concept' (http://bl.ocks.org/rengel-de/5603464). Engel's version of this work was inspired by 'Simile Timeline' by David François Huynh (http://www.simile-widgets.org/timeline/). It shows events that have a defined start and/or end in the time continuum in the form of a timeline or time chart. On the horizontal plane, events can be instants (one date only) or intervals (start date and end date). On the vertical plane, these events are stacked, and their position is determined by the availability of space within the timeline.
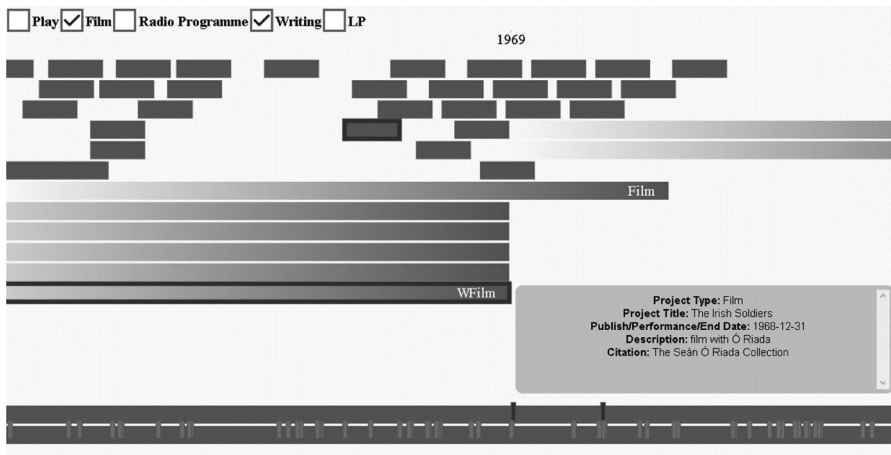
Figure 4. Music-related projects by Seán Ó Riada. Both 'W' and 'Film' denote both of Ó Riada's roles as writer of script for this film and directorship of the film, entitled 'The Irish Soldiers'.

Figure 4 demonstrates how complexity grew whilst attempting to represent Seán Ó Riada's various roles in different projects. There were similar examples that prompted the author to re-design this interface when anomalies were introduced with new data, for instance, where activities were known to have happened but no written evidence existed for other music-related projects. Such problems required that a high level of flexibility was needed in order to customize the interface to accommodate different anomalies in the project's data. By continually revisiting and engaging with emerging issues when re-representing data, valuable insights emerged about the timeframes and nature of each project that was created during Ó Riada's career.

I will return to the SÓRC Project later, evaluating this project as an example of the ongoing negotiation of representation (and classification in particular) that is needed in research when it relates to computation and musical practice. However, in order to understand the disciplinary context of classification as it is used in ethnomusicology more broadly, we must first consider the ways that classificatory thinking has previously been applied and communicated in music research.

Classificatory thinking[6]

Over the past century, debates have at times emerged between musicologists and ethnomusicologists because of their differing approaches to and appraisals of classification. From a political and philosophical perspective, there are

---

[6]In digital humanities, classificatory thinking with computation is described by Berry (2015, 126). Quoting Adorno, Jarvis (1998, 177) describes it thus: 'Classificatory thinking … does not say what something is, but only what it comes under, of what it is an illustration or an example, and what therefore it is not itself'. In this article, I demonstrate what classificatory thinking has meant for the investigation of musical phenomena.

demonstrated reasons why evolutionary stances on music and the impositions of Western bias are problematic for ethnomusicologists and have resulted in a resistance to classifying musical phenomena. This thinking may be considered across a spectrum, from what Adorno (1966, 152) calls 'identity thinking' (schemes of classification) on one end, versus 'dialectical thinking' (a focus of ethnomusicologists on gathering perspectives, understandings and nuances from practitioners of a particular musical tradition) on the other. Berry (2015, 123) explains that with identity thinking, 'the particular is dissolved into the universal' and as a result, the development of important activities in ethnomusicology such as fieldwork can be understood as focused on the particular. The resistance to classificatory thinking may also be understood in terms of a difference between methodological approach and the intended audience for research. Aside from such differences, it is possible that a more balanced appraisal of classification can be achieved, and that classificatory thinking may gain ground in ethnomusicology through current needs for research and careful consideration of how it can be engaged and presented.

Classificatory activity in ethnomusicology can be linked to the growth of archives, when ever-increasing amounts of data from around the world have led to attempts to establish order and with it the use of 'borrowed scientific questions' (Seeger 1991, 349). It has also often paralleled advances in technology such as the invention of the Edison phonograph, as research focused on the audio recordings that were collected by researchers from continents throughout the world (Clayton 1996). The rapid growth of an early archive of such audio recordings led to the establishment of the Berlin Phonogramm-Archiv, whose first director was the ethnomusicologist Erich Von Hornbostel in 1905. Some of the approaches began with these attempts at 'top-down' classification by privileging evolutionary questions about music over others, taking the music of societies out of context to 'compare the forms according to one parameter or another' (Seeger 1991, 349). Throughout the twentieth century, the approaches to classification were continually debated and re-developed by ethnomusicologists (Merriam and Merriam 1964; Zemp 1978, 44). Today, similar broad approaches of comparison continue to be conducted in revised form, mostly in musicology (Grauer 2006; Savage 2018). Even more so in the music industry, algorithms that drive music streaming services continue to emulate similar forms of selective classification carried out by researchers.[7] However, the reception of these approaches in ethnomusicology has sometimes been one of scepticism, critical scrutiny and even disregard (Nettl 1970; Smith 2005, 17; Stone 2008, 57).

---

[7]Developers at music streaming service – Pandora (powered by the Music Genome Project) decide what traits of songs are important. See, for example, Kennedy (2015), 'Pandora calculates this musical similarity through the Music Genome Project, a database created by musicians, musicologists, and ethnomusicologists who, after 5 to 15 minutes of analysis, tag each song with attributes from a pool of roughly 450 "genes"'.

In their essence, schemes of classification are produced out of a human need to create order, as in the words of anthropologist Lévi Strauss, 'any classification is superior to chaos' (1966, 15). For earlier musicological studies then, with a wealth of information that was preserved, it became possible for musical phenomena to be organized, selected, simplified and translated into discrete blocks of evidence in the laboratory. This allowed scholars to generate typical patterns, to produce and communicate their insights relating to more generalized understandings of musical traditions.

Archives and cultural institutions are once again overseeing an exponential growth in collection data (Moss, Thomas, and Gollins 2018). For ethnomusicologists, a primary concern for research is the deeper meaning and subtle nuances behind musical practice within any one musical tradition, or single-volume ethnography (Seeger 1991, 351). This may explain why there has been a movement away from comparative, classificatory thinking in ethnomusicology, and an even more recent and urgent focus on decolonizing our understandings of these cultures within the discipline and the academy (Smith 2013; Chávez and Skelchy 2019). However, the ongoing application of classification methods to the study of music has evolved significantly since the early 1900s, and there have been many attempts to correct past mistakes.

A brief history of the Hornbostel and Sachs scheme for musical instrument classification will serve as a backdrop that highlights approaches to classificatory thinking in music research and demonstrate how issues have both emerged and been debated.[8]

Classifying musical material – Hornbostel and Sachs

In the 1870s, the rise of a new type of bibliographic description known today as the Dewey Decimal Classification influenced a vast number of institutions who radically changed the way that they organized their holdings. By using this scheme, in the ensuing decades, libraries would essentially access their holdings not by the subject area of books but by their contents (Satija 2013). The approach to musical classification developed in a similar manner. The roots of musical instrument classification had stretched back centuries, as stated by Magnusson, the origins of organology being found in Hellenic times (2017). However, in the 1880s, a scheme was devised by the musicologist Sourindra Tagore for Indian musical instruments, and this was adapted and advanced by curator Victor-Charles Mahillon with more universal application in order to suit the cross-cultural organization of musical instruments (Mahillon 1900).

Ultimately, the refinements made by Mahillon led to a successful and universal system which was then made famous by Hornbostel and Sachs and

---

[8]For a more comprehensive account of the Hornbostel and Sachs scheme for the classification of musical instruments, see Kartomi (2001). Kartomi focuses on the approaches of scholars throughout the 1900s. In this article, I will focus on the significance of these approaches for ethnomusicologists.

published in 1914. The scheme continues to be developed, updated and commented upon, especially in musicology and organology (Birley, Eicher, and Myers, 'Voices for the Silenced', 2000). It was a success by these terms as 'a powerful means for finding and identifying instruments' (Kartomi 2001). It initially implemented a downward taxonomy, where the approach of logical division privileged certain categories of how sound was created without focusing on more complex ideas, like variations in the constructions of the instruments themselves. This approach naturally allowed the cross-comparison of cultural artefacts across hundreds of cultures to progress and continues to be used in museums (such as the Musical Instrument Museum in Arizona, USA) to this day, meeting the original intent of its design.

The H&S scheme has been adapted worldwide, but numerous small and large revisions by scholars such as Elschek and others have revealed its limitations (Kartomi 2001). Others have highlighted its shortcomings such as its overemphasis on Western musical instruments (Smith 2005). As noted by Kunst, where the more unusual instruments do not fit in, they were added to a 'miscellaneous' category, adding to confusion when the unique variation of a particular instrument made adequate classification problematic, leading to 'anarchy' within the scheme (1974, 57). Furthermore, Magnusson states that in many cases, the classification confirmed to physical description but failed to account for the playing of the instrument and so it 'doesn't match the reality of *actual* musical practice' (2017, 289) (emphasis added). Ultimately, for ethnomusicologists, the need for context surrounding these items has been a critical factor in its acceptance as a valid scheme.

Since its inception, several updates have been made to the scheme, for various reasons. In her review of changing trends in research on musical instrument classification, Kartomi charts the dichotomies that existed between the taxonomies of classification that were used throughout the scheme's history (2001). She describes how in its early years, the scheme was tied to a more general or universalist set of theories about music and musical instruments and later revisions of the scheme demonstrate reasons why the system needed improvement, such as the interaction between the instrument and human behaviour (Lysloff and Matson 1985). Calls for re-adjustment each time were reflected in the number of instruments that researchers had at their disposal, their knowledge of the instruments and in particular, their understanding of musical practice (Kunst 1974, 56). Thus, over the years when researchers began to make more detailed studies of instruments, different types of adjustments made to the scheme depended on the knowledge and needs of the researchers making these changes.

Beyond the usefulness and continued application of the H&S scheme, more elaborate attempts to update the scheme have highlighted its fundamental problems. In 1969, an approach developed by Elschek implemented a revision to the system that accommodated an upward taxonomy (or classification) to

include performance practice. This moved the focus to the context of their performance rather than logical division (Kartomi 2001). Kartomi notes that Elschek's revision represented a welcome, fundamental shift in classificatory thinking (2001). This new approach grouped instruments according to the anomalies that they presented to the researcher, thus avoiding the influential bias that was inherent to top-down classification.

The history of the H&S scheme illustrates a core problem with taxonomy and classification in general – the failure of universal models to adequately represent the complexity of phenomena *in practice*. In 2005, Smith argued that systems such as H&S scheme have never been widely adopted by ethnomusicologists because their emphasis is not placed on interpretation. For Smith, the emphasis is 'antithetical to the interpretative thrust of much research in the Arts and Humanities' (Smith 2005, 17). This highlights that the ethnomusicologist's concern in understanding music is placed on interpretation, and less influenced by so-called, universal or general understandings of music.

In a more conciliatory tone, Kartomi concluded in lessons learned from the aforementioned approaches that 'any scheme must amount to a compromise between the demands of logic and inclusivity in the real-world instruments seen in their socio-musical contexts', hinting at a need for greater tolerance of the mistakes made by using these models (2001, 308). Aside from their practical use in museum contexts, I would argue that such models of classification may be useful for research, if only for a certain period of time. Kartomi's analysis of the history of the classification scheme demonstrates that if inadequacies are an acceptable part of the scheme to a degree, that compromise is a part of any system and that the scheme is more useful to the scholars for whom it is developed. I would add that perhaps classification schemes may be more useful during the process of conducting research and that the resultant evidence is always insubstantial in lieu of extensive fieldwork.

Classifying musical practice – Alan Lomax's cantometrics system

Debates that connect classificatory thinking with musical practice have their roots in the research advances described above. As field recordings and repositories of sound such as the Berlin Phonogramm-Archiv became increasingly prevalent throughout the twentieth century, so too did a rise in the research area of comparative musicology, with its focus on classifying musical practice, in particular sound analysis in the laboratory (Stone 2008, 24–26).

The development of a project involving a system called 'cantometrics' (which literally means measurement of song) grew from the work of ethnomusicologist and ethnographer Alan Lomax who incidentally had studied under Curt Sachs, mentioned above. In some ways, the issues it presented would perhaps overlap with the problems associated with the inadequate address of anomalies in the H&S scheme. It provides rich insight into the debates surrounding computation

in ethnomusicology and has also had a rich history of critique from ethnomusicology (Shelemay 1991, 284).[9]

Cantometrics was developed as a team effort in the 1960s by Lomax and other researchers in general to relate the world's vocal music to social organization (Shelemay 1991, 284). It was one of the most elaborate, long-running projects that involved classification with ethnomusicology. The project has persisted over the past 60 years and has been updated several times. Ethnomusicologist Anthony Seeger (2006, 217) as 'one of the largest comparative projects ever imagined for the study of music', featuring over 17,000 recordings made by Lomax during fieldwork carried out in the mid-twentieth century. The project incorporates Lomax's self-devised grid categorization system which classified the behaviours of performer song styles throughout the world based on performance traits (vocal techniques, group singing and accompaniment), moving research towards music in the context of human behaviour. Lomax attempted to model key patterns of 'co-action' in the everyday lives of performers, attempting to link art with social life (1977, 119).

Issues arose within ethnomusicology during the development of this project in relation to its use of classification. In 1970, upon reviewing the progress of Lomax's Cantometrics project and his book *Folk Song Style and Culture*, foremost ethnomusicologist Bruno Nettl pointed towards a major difficulty with its approach to classification. According to Nettl, Lomax's system included a rating of 1–10, especially on the performance traits of singers, which were evaluated by listening, and he maintained that investigators could be trained so that all would rate a recording identically (1970, 440). Nettl determined that this was a questionable procedure and tested this by trying to replicate the method in his own graduate classes of musicologists. The result was such a level of disagreement between students that he 'despaired of its feasibility' (1970, 440). This fundamental contention between researchers on Cantometrics revealed the problematic nature of assigning discreet categories (a numbering system in this case) to musical practice, especially by outsiders to a range of musical traditions.

Since the publication of Lomax's book on Cantometrics, the enthusiasm for the system had largely waned amongst ethnomusicologists. Scholars have noted how the system has not been widely adopted by other researchers. Savage (2018, 2) notes how, in the years after it was published, 'the ethnomusicological community ultimately appeared neither to try it nor to like it'. It is noteworthy than the concerns of critics such as Middleton who have emphasized how it exacerbates issues of cultural homology (1990, 152), for example, the attempts at

---

[9]Musical scores can also be understood as abstractions of musical practice. Abstraction of musical sound from its cultural, social and historical context was coined as 'Schizophonia' by R. Murray Schafer (1969). Whilst a few points could be made in this article in relation to the abstraction of musical practice, it is beyond the scope of this paper. However, it warrants further study, as it also links to core debates in musicology and ethnomusicology.

placing fixed and rigid ideas with computation on an idea that a culture reflects its society. It was argued by Middleton that certain cultural traits do not define societal structures, as they may only be *desirable* rather than operative within that society (153).

In recent years, further debates have arisen because of work that was inspired by Cantometrics with Lomax's former colleagues, albeit through the influence of other fields of inquiry. Scholars such as Grauer (2006) and Savage (2018) have revisited or moved beyond Lomax's research on Cantometrics to link studies with current developments in genetic anthropology and archaeology. Savage (2018) notes that the Cantometrics project has not completely become obsolete, and that it 'can still provide both inspiration and cautionary lessons for future exploration of relationships between music and culture', because of the possibilities to which it has attested. For example, Grauer attempted to demonstrate that new genetic findings (such as biological evolution) had paved the way for a re-evaluation of the history, development and significance of 'mankind's earliest music' (2006). His invitation to critique from ethnomusicologists reveals insight into the stances of ethnomusicologists on the theme of classification and what it means for investigating musical phenomena.

This debate between Grauer and some prominent ethnomusicologists in the *World of Music* journal sheds light on the continuance of underlying concerns of ethnomusicologists – that the researcher should have attained sufficient local knowledge when classifying or communicating the results of classifying musical practice (Stock 2006; Nettl 2005). Their responses to Grauer's theory highlighted that some conditions would have to be met in order for his cross-comparative approach to be more acceptable to ethnomusicologists. Responses cited a number of inadequacies with Grauer's work, using insightful language – that as a historical study, it was 'unpredictable', 'unsafe' and that evidence ran the 'danger' of the assumptions of external *etic* (outsider) interpretations rather than internal, *emic* (insider) roles and interpretations in these cultures (Nettl 2005; Stock 2006).[10] At a fundamental level, this debate reaffirmed a core problem – that general classifications of musical phenomena are inadequate because researchers fail to account for local interpretations of musical practice in sufficient measure. Thus, the central concerns of ethnomusicologists in response to Grauer were that attempts to model or classify cultural production result in the implementation and codifying of bias.

Discussion of the cultural insider and also the outsider positions of the researcher in fieldwork have long been a concern for ethnomusicologists and are often debated and well documented in ethnographies (Herndon 1993; Rice 1996). It is a challenge for the outsider researcher (and sometimes insiders)

---

[10]Etic may be described as an approach to a culture that is general, non-structural and objective in its perspective, where the researcher is not already familiar with the inner functioning of a culture. Emic may be described as an approach to a culture where the researcher has already gained insider perspectives.

to adequately support their evidence with sufficient research on local, emic understandings, as immersion within a musical tradition takes a significant amount of time to attain. Sufficient immersion in a culture leads to the researcher making informed claims about cultural practices. As noted by Stock, it is also important for ethnomusicologists to know 'what is at stake' when decisions are made by the researcher who classifies musical practice (2006). For the comparative musicologist, however, this sustained immersion in local activity is sometimes not feasible or desirable due to time constraints placed on the research process for codifying and classifying data.

Grauer's response to these critiques is particularly informative as it exposes a clear issue with computation in areas of research that seek interdisciplinary practice, especially where ethnomusicologists' scepticism of evidence arises. In responding to the view of the ethnomusicologist that emic insider approaches should be discussed and what is at stake when decisions are made to be communicated to the intended audience of the research, Grauer (2006) hinted at how classification could be adapted. He stated: 'This … expresses a standard that should, ideally, be applied to every research project in our field … the sort of concern that has made so many suspicious of methodologies such as Cantometrics, so often perceived as running roughshod over all the many nuances entailed in the awareness of local cultural context'.

In the 1990s, the foremost ethnomusicologist Timothy Rice wrote about how ethnomusicologists themselves have grappled with issues of what constitutes insider knowledge of local cultural context. Rice referred to Riceour's hermeneutic arc to describe the ways in which ethnomusicologists come to explain the worlds that they encounter (1996). He cites an insightful article by Marcia Herndon that demonstrates the contradictions that result when the researcher is neither outsider, nor insider, be it through relationships with people in musical traditions, cultural immersion or musical proficiency (Herndon 1993). Rice explains that experience in the field transforms the individual, during the research process and demonstrates that transformation continually occurs for the 'outsider' researcher and even the 'insider' who is behind the work. For the ethnomusicologist, the process of transformation as the outsider in becoming an insider is not simply linear, but a process that has no end point. Their ability to communicate their experience for others is continual and emerges through continuous interaction during fieldwork and performance.

Thus, within Grauer's debate with ethnomusicologists, we can read much of the emerging problems for the scholar who classifies cultural data as a lack of significant focus on transformative experiences in the field. This can be read in terms of the aforementioned 'hermeneutic arc', discussed by Rice. During fieldwork activity, the researcher undergoes a transformation within the hermeneutic arc through music-making, performance and by gathering experiential knowledge. The arc also leads in the opposite direction – to the researcher coming to terms with their own experience. They challenge their pre-

understandings of musical practice before they then bring it to a language that can be communicated to the outside world by becoming an ethnomusicologist (Ricoeur 1981, 164). Thus, the outsider learns to become both researcher and the researched during a period of knowledge gathering.

If the individual is transformed (as Rice says) through the experience of the hermeneutic arc, then a period of experimentation through participant-observation and active music-making is tantamount to understanding the insider perspective. This can then be applied to computational practice; I suggest that in the act of experimentation with historical material, and before understanding is communicated to the research community, the act of classification can also be seen as an important activity in developing sufficient experience. Just as the ethnomusicologist must engage with the musical culture itself – through active music-making and connecting with musicians within the culture – the historical ethnomusicologist must experiment with multiple data-sets and forms of data organization and representation as a way to follow the hermeneutic arc. It is when the researcher attempts to communicate this experience with outsiders (or the academic community) such as the H&S, Cantometrics and SÓRC Projects, that the ability to convince with classification rests on shaky ground. Therefore, classification is best used during the research process and not afterwards. Further methods should be developed to fully communicate these experiences and data decision-making, with transparency, to the wider research community, on an ongoing basis.

To return to Grauer, his concluding argument resonates with the concerns of research in communities involved with classification or computation. Through his approach, he claims not to 'convince per se' but to share a 'promising line of research', by arguing for the 'reasonable consideration of certain possibilities' with his approach (2006). Grauer claims that he prefers to progress from the 'outside in', rather than the 'inside out' implied by the ethnomusicologists. Such perspectives demonstrate that experimentation is valuable for possibilities to be uncovered and that communication about aspects of computational activity must be improved.

This idea can be particularly useful when applied to the SÓRC Project. Whilst the debate between ethnomusicologists and comparative musicologists clearly has a lot to do with hermeneutic immersion and subsequent transformation of the self to develop new understanding for the researcher in the field, it also has a lot to do with the place of immersion for the scholar in the process of field research. The experiences attained with anomalies – through developing data sets and visualization of musical practice in the SÓRC project demonstrates that immersion and experimentation with classification can be a useful methodology during the process of research. Such attempts can start to bring knowledge from the lived, musical experiences, into the digital world – bringing the outsider researcher in. As explained later in this paper, fieldwork and extensive ethnography explores the ethnomusicologist's

transformation from the 'inside out' as interview respondents can provide a means for the researcher to develop a language that could relate change or continuity in musical practice.

Communicating transparency

The examples of classificatory thinking above demonstrate that long-term music-making, participant-observation and experimentation are activities that allow us to move from the 'outside in' and 'inside out' during fieldwork. However, it is also crucial to expose classificatory thinking during this process and in the evidence that is used to support these ideas to establish sufficient academic rigour. In the case of Cantometrics, the claims made by ethnomusicologists demonstrated that acceptance of the Cantometrics approach would have required an even closer attention to detail such as classificatory decisions in order to assess Lomax and Grauer's findings about local context. Communicating transparency about decisions then is highly important to achieve fuller integration of computing in ethnomusicology.

Savage described some shortcomings of Cantometrics regarding transparency, including how 'Lomax often did not make clear the difference between the data he had available and the data actually used in his analyses' (2018, 4). Furthermore, Savage (2018, 6) notes how statistical analyses of his data were: 'highly complex, changed often and rarely were fully explained'. Similarly, Grauer (2006) also emphasized that 'there has been an equivalent effort to conduct the research in such a way that all materials studied are clearly referenced so they may be independently checked for evidence of either error or bias'. Thus, the overriding issue with such elaborate projects demonstrated the tensions that existed both in approach and how quantified findings were communicated.

Hornbostel and Sachs, Lomax and Grauer's work demonstrated issues that emerged from the developments of broad systems of classification. However, like the SÓRC Project, it also demonstrated that even though resultant evidence rests on shaky ground in these systems, there are numerous possibilities that can aid researchers in understanding features of musical phenomena during the process of investigation. This is especially apparent in the understanding and documentation of complexity using data visualization in the SÓRC Project. For ethnomusicology then, I suggest that the effectiveness of these approaches depends on each project's goals, the application of that knowledge and the ways that research is communicated.

An emerging research environment

Research in ethnomusicology has often integrated scientific enquiry, particularly when large amounts of data have become available with archives.

However, in recent decades, researchers have focused on long-form ethnography and extensive fieldwork, where research is conducted at the sites of musical practice – within musical communities. Fieldwork is now considered by some to be a 'hallmark' of the discipline (Nettl 2005, 137) and quantitative approaches 'are often rejected unless grounded in the value systems and categories of the people themselves' (Stock 2003, 136). An important aspect of ethnomusicological investigation is the ability of the researcher to immerse themselves in a musical tradition, although some remain outsiders even after extensive fieldwork has been completed.[11] As a result, approaches that deal exclusively with archival sources and history in the discipline have traditionally been less prevalent.

Perhaps this focus has a lot to do with the research questions posed by scholars, and the understandings about music during each successive period in the development of the discipline. In the 1950s, Chase posited a dividing line between the priorities of ethnomusicology and musicology, asking 'Might not these two allied and complementary disciplines divide the universe of music between them, the one taking the past as its domain, the other the present?' (1958, 7). Provocative as such questions have been, the dividing line between these disciplines has never fully been drawn but concerns with understanding the activities of musical traditions in the present continue to hold sway in ethnomusicology. Evans and Pritchard claim the lack of historical studies has been influenced partly by 'a vein of antihistorical feeling that ran through anthropology', as cultures in the past were seen to have 'fairly fixed traditions' (as cited in Stone 2008, 181).

Even though much recent research in ethnomusicology has been based on anthropological and social theory, the discipline has developed some approaches to historical studies. The emerging branch of historical ethnomusicology shows that there have been some shifts towards developing approaches to history when studies of the present are not possible (Hebert and McCollum 2014). This branch has included studies that are now beginning to demonstrate novel ways to interpret musical history, for example, challenging the notion of time to avoid the 'telescoping of history towards the present' (Hebert and McCollum 2014, xi). Such approaches are particularly helpful for understanding history as successive but not cumulative.

Alongside the emergence of novel research into the musical past, studies focused on musical biography have also increased (Stock 2003). Some of these studies have demonstrated ways of interpreting the worlds of the individuals who are both *of* these communities as well as emerging *from* them to become well-known individuals. For example, Virginia Danielson in her study of Egyptian vocalist Umm Kulthūm demonstrates how biographical

---

[11]O'Flynn (2017) suggests that fieldwork is significant because it causes academic discussions to become 'grounded in everyday musical practices and beliefs' (19).

studies in ethnomusicology can move beyond studying the individual towards a focus on a number of members of a community as agents of continuity or change (1997). In biographical studies then, masters of a tradition are chosen as representatives, but they are also understood in the context of their contemporaries.

Computation is now a facilitator for these new approaches. It can augment biographical and historical research in ethnomusicology. Hebert and McCollum note that biographical and discographical works can be more comprehensively developed (2014, 23). However, the SÓRC Project has been the first to take this type of investigation into the careers of musical artists further.

Evaluating the Seán Ó Riada project

At various points throughout the digital development of the Seán Ó Riada Project, ethnographic interviews were carried out with a selection Ó Riada's colleagues and those who were knowledgeable about his legacy. Data from these interviews served to contribute to an ethnography, but they also informed digital exploration. Broad patterns were explored in the digital prototype model and ethnographic interviews contextualized each music-related project or collective of projects. An example of this was the evidence provided by one interviewee about a radio series with Ó Riada that: 'I think the most we ever did was, maybe we did thirty in a year, but usually around … I suppose six months thirty-six weeks. It was hugely popular you know?' (Ó Sé). In this case, it was possible to determine exact dates for radio shows, widening the scope of the research, and bringing nuance to interpretations.

The data from these interviews also provided important insight from the experiences of Ó Riada's colleagues, providing further avenues of exploration (including collaborators, details, dates of events and search terms) to add to the data sets. In some cases, evidence from these interviews prompted searches in archives across Ireland, revealing detail about lesser known projects such as important theatre material that were missing from the literature and the SÓRC. This allowed insider information from interviewees to contribute to the development of broader patterns in data by updating the data sets and visualizing the results. Gaps in the subsequent patterns of data within the digital visualization were particularly informative and have significantly deepened our understanding of Ó Riada's role in the wider music community.

The activities of continually gathering data, building a digital prototype and visualizing results then facilitated a continual re-working of classification and immersion in the subject of research. This approach led to a constant revaluation of the structure of the prototype model and its data, ultimately exposing the hidden complexities of the archival collection itself and the musical practices of Ó Riada and his contemporaries.

There were many aspects of timeline visualization that aided discovery in the SÓRC Project, such as the appearance of patterns in weekly radio shows and consistencies with the production of projects. However, a host of anomalies emerged as classification and the representation of all Seán Ó Riada's activity with music-related projects grew in complexity. As shown in Figure 5, each step of iterative design was prompted when new data to be entered caused reconsideration of the timeframe of production of projects.

Anomalies arose as the coding of the digital prototype model and the addition of data progressed, especially where evidence was absent from archival documents. Interview and literature review evidence indicated that Seán Ó Riada's creative output during the 1960s involved an increased use of novel or improvised systems for musically notating arrangements for Irish traditional music. Such experimentation did not require musical scores to be written. Through increased interaction with oral traditions, Ó Riada had bypassed methods of musical notation in favour of a system of 'index card' scoring (Ó Súilleabháin 2004). Traces of these short-hand notes appear within the SÓRC; however, these documents lacked provenance detail. On the other hand, classical manuscript scores in the collection included dates and provenance available for archival cataloguing. Thus, it became clear that the SÓRC and the timeline design of the Digital Visualisation Framework would inherently fail to represent a significant number of musical activities, raising increased awareness of anomalies. Furthermore, this connects again with the broader challenge between archival cataloguing and classification systems failing to accommodate the particularities of some items.

Returning to the Digital Visualisation Framework, a number of overlapping activities between projects became difficult to represent when new data was
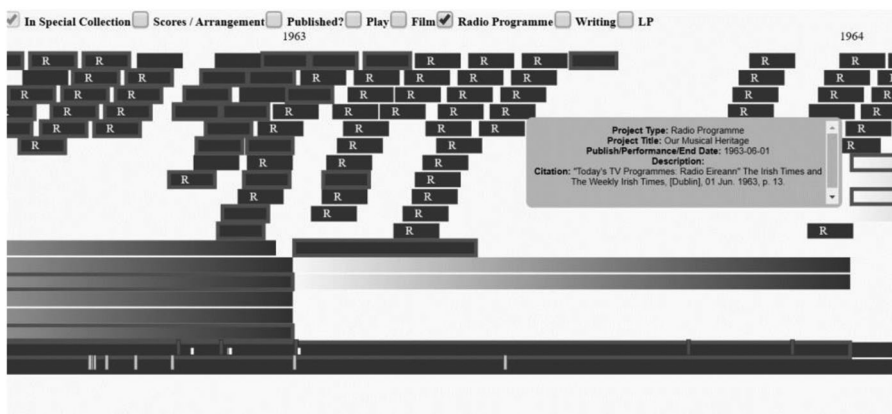
Figure 5. A screenshot of the digital prototype developed for the SÓRC Project, highlighting patterns that became discoverable due to adding data to datasets and coding visualization (https://oriada.o-em.org).

discovered. The complexity deepened with the addition of new data; an attempt was made to classify media productions into their respective mediums. To complicate this further, many projects evolved over long periods of time, or were derivative works. For example, a sonatine written in 1957 was included as part of a major work, Nomos No. 2, which was published in 1963. Several examples of such projects had been started at one point during Ó Riada's career and then revisited at a later stage.

Classification under the above timeline-centred prototype involved presenting musical phenomena over time – where the performance of these music-related projects masks the hidden complexities and the agendas regarding other music-related practices. These include the agendas of Seán Ó Riada, his colleagues and organizations who commission musical works. In the timeline, time proceeds linearly, a construct of Newtonian timeframes. But this was challenged when interviewees added insightful evidence. As commented upon by an interviewee and collaborator of Ó Riada's, they felt that 'he was doing everything simultaneously', and evidence attests to the perception that some projects were developed at different times depending on several factors, including financial commitments (Marcus 2016). To return to Adorno, with identity thinking the particular is dissolved into the universal. In the SÓRC project, a challenge lay in representing each project as itself, but also as part of all other projects. Each project was represented within the digital prototype as part of the universal using classification, but interview evidence also allowed the particularities of each project to emerge. Critiquing these tensions became a crucial part of the SÓRC Project.

The complexities involved with musical practice demonstrated a number of insights between interview evidence and digitally visualized metadata. It exposed that when critically applied, immersion and experimentation with metadata proves useful for discovery, but also for deeper understanding to emerge from the anomalies present in archival documents and musical practice. Overall, this process demonstrated that local context is crucial for helping us understand each individual music-related project, but that more general representations of projects are also helpful when trying to understand their significance as part of clusters.

Discussion

The examples outlined in this paper demonstrated how successive generations of ethnomusicologists have grappled with classificatory thinking with the proliferation of data in archives. The resultant debates are useful for understanding the place of classification in each successive emerging research environment. Earlier attempts at classification led to impositions and subsequent revisions but resistance to embedding classification, as demonstrated with the H&S scheme. Later concerns of ethnomusicologists with classificatory thinking

raised issues with classification for musical practice, such as the Cantometrics project. In more recent years, debates highlighted how experience and scholarly immersion in musical traditions have been demonstrated as key requirements for scholarly rigour in ethnomusicology.

While the debates surrounding classification are a useful lens by which to explore the computation of musical practice, there are some key insights from ethnomusicologists that can aid the ways that the research community can approach how anomalies from computation are addressed. The SÓRC project highlighted some of the ongoing tensions that exist in ethnomusicology with computation, but it attempted to address them by including extensive ethnography in the research process.

The SÓRC Project also highlighted a number of issues that lie at the heart of the current interface design in the humanities. For example, scholars such as Borgman (2010), Drucker (2011) and Kräutli (2016) have reiterated that we currently lack the suitable tools to make sense of humanities data. Kräutli (2016) has augmented this argument by developing suitable digital tools that address the problem. More recently, Vane (2018) has also expanded on ways to explore the development of timeline visualizations to assess archival data.

The use of these research developments for musical practice is less well understood. Like the Hornbostel and Sachs scheme or Cantometrics, in the SÓRC Project, contextualization was improved during the research process through the interrogation of musical practice. Transparency was key to the communication of results. In digital humanities, transparency has become the hallmark for good practice, to avoid what Drucker (2011) calls the 'intellectual Trojan horse' of some graphical design. Such rhetoric calls for transparency but requires embedding of anomalies to normalize the epistemological consequences of knowledge production from digital sources. Rather than being reductionist, discreet representations, the development of digital representations are used by these scholars to understand the bias in collections, and the tool itself, effectively interrogating the scholar's own classification to reveal transparency. The building of digital representation is seen as a highly complex process, both in terms of the visual language and interpretation.

Conclusion

This paper presented debates that have arisen when large amounts of data have been engaged by researchers in ethnomusicology, where the use of classification has been suggested as an approach to research practice. Historical examples demonstrated that engagement with large amounts of data inevitably introduced tensions, as the reliance on discreet representations of data ran the risk of introducing unbalanced perspectives about musical phenomena.

These tensions were challenged with the argument that the act of classification facilitates immersion and experimentation during historical research

to aid investigation. Although in-depth ethnography alone allows the researcher to achieve suitable immersion with cultural data to facilitate interpretation, in historical studies, the researcher needs to focus on the limitations of the data at hand. For the SÓRC Project, engaging a digital prototype on a continual basis allowed knowledge about musical practice to emerge.

Ultimately, the SÓRC Project demonstrated that classification can be engaged as part of a research environment. The combination of computation and fieldwork prompt us to analyse the representations of history that we attempt to create to immerse ourselves within the subject of research. Thus, the continuous re-classifying of data can be understood as an experimental, immersive approach to research that complements, challenges and augments fieldwork.

Whilst the SÓRC Project did reveal the suitability of event-based research for computation, other approaches for using computational activity with archival data and ethnography have yet to be explored. For example, future research might identify ways by which interpretation from interviews may be more closely combined with visualizations of data to reveal insights at different stages of the research process.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributor

Patrick Egan (Pádraig Mac Aodhgáin) is an early career researcher and assistant lecturer in digital humanities at University College Cork and works on the development of digital models that assist ethnographic research on archival collections. He studied for his PhD at University College Cork in digital humanities and ethnomusicology. Egan is also a musician and ethnomusicologist focused on Irish traditional music, and in 2019 was a Kluge Fellow in Digital Studies and Fulbright Tech Impact scholar at the Library of Congress in Washington, DC.

References

Adorno, Theodor W. 1966. "Negative Dialektik." *Frankfurt am Main* 21980: 86.

Berry, David M. 2015. *Critical Theory and the Digital.* Bloomsbury Publishing USA.

Birley, Margaret, Heidrun Eicher, and Arnold Myers. 2000. "Voices for the Silenced: Guidelines for Interpreting Musical Instruments in Museum Collections".

Borgman, Christine L. 2010. "The Digital Future Is Now: A Call to Action for the Humanities." *Digital Humanities Quarterly* 3 (4).

Chase, Gilbert. 1958. "A Dialectical Approach to Music History." *Ethnomusicology* 2 (1): 1–9.

Chávez, Luis, and Russell P. Skelchy. 2019. "Decolonization for Ethnomusicology and Music Studies in Higher Education." *Action, Criticism & Theory for Music Education* 18 (3).

Clayton, Martin. 1996. "Ethnographic Wax Cylinders at the British Library National Sound Archive: A Brief History and Description of the Collection." *British Journal of Ethnomusicology* 5: 67–92. Accessed May 29, 2020. www.jstor.org/stable/3060867.

Clayton, Martin. 2008. "Toward an Ethnomusicology of Sound Experience." In *The New (Ethno)musicologies*. Lanham: Rowman & Littlefield.

Danielson, Virginia. 1997. *The Voice of Egypt: Umm Kulthūm, Arabic Song, and Egyptian Society in the Twentieth Century*. Chicago: University of Chicago Press.

Drucker, Johanna. 2011. "Humanities Approaches to Graphical Display." *Digital Humanities Quarterly* 5 (1): 1–21.

Egan, Patrick. 2019. "Exploring Ethnography and Digital Visualisation: A Study of Musical Practice Through the Contextualisation of Music Related Projects from the Seán Ó Riada Collection." PhD diss., University College Cork.

Grauer, Victor A. 2006. "Echoes of Our Forgotten Ancestors." *The World of Music*, 48: 5–58.

Hebert, David G., and Jonathan McCollum. 2014. "Methodologies for Historical Ethnomusicology in the Twenty-first Century." In *Theory and Method in Historical Ethnomusicology*. Lexington Books.

Herndon, Marcia. 1993. "Insiders, Outsiders: Knowing Our Limits, Limiting Our Knowing." *The World of Music* 35 (1): 63–80.

Hsu, Wendy. 2011. "Redefining Asian America: Cultural Politics, Aesthetics, and Social Networks of Independent Rock Musicians." PhD diss., University of Virginia.

Jarvis, Simon. 1998. *Adorno: A Critical Introduction*. Psychology Press.

Kartomi, Margaret. 2001. "The Classification of Musical Instruments: Changing Trends in Research from the Late Nineteenth Century, with Special Reference to the 1990s." *Ethnomusicology* 45 (2): 283. doi:10.2307/852676.

Kennedy, Walker. 2015. "Music Streaming Services, Programming Culture, and the Politics of Listening".

Kräutli, Florian. 2016. "Visualising Cultural Data: Exploring Digital Collections Through Timeline Visualisations." PhD diss., Royal College of Art.

Kunst, Jaap. 1974. *Ethnomusicology: A Study of Its Nature, Its Problems, Methods and Representative Personalities to Which Is Added a Bibliography*. Berlin: Springer Science & Business Media.

Lévi-Strauss, Claude. 1966. *The Savage Mind*. Paris: University of Chicago Press.

Lomax, Alan. 1977. "Universals in Song." *The World of Music* 19 (1/2): 117–130.

Lysloff, René T. A., and J. Matson. 1985. "A New Approach to the Classification of Sound-Producing Instruments." *Ethnomusicology* 29 (2): 213–236. doi:10.2307/852139.

Magnusson, Thor. 2017. "Musical Organics: a Heterarchical Approach to Digital Organology." *Journal of New Music Research* 46 (3): 286–303.

Mahillon, Victor-Charles. 1900. *Catalogue descriptif & analytique du Musée instrumental du Conservatoire royal de musique de Bruxelles*. Vol. 3. A. Hoste.

Marcus, Louis. 2016. *Personal interview*. Irish Film Institute, Dublin, Ireland. October 20, 2016.

Merriam, Alan P., and Valerie Merriam. 1964. *The Anthropology of Music*. Evanston: Northwestern University Press.

Middleton, R. 1990. *Studying Popular Music*. Milton Keynes: McGraw-Hill Education (UK).

Moss, Michael, David Thomas, and Tim Gollins. 2018. "The Reconfiguration of the Archive as Data to be Mined." *Archivaria* 86 (86): 118–151.

Nettl, Bruno. 1970. "'Review.' Review of *Folk Song Style and Culture by Alan Lomax*." *American Anthropologist* 72 (2): 438–441.

Nettl, Bruno. 2005. *The Study of Ethnomusicology: Thirty-one Issues and Concepts*. 2nd ed. Champaign: University of Illinois Press.

O'Flynn, John. 2017. *The Irishness of Irish Music*. Routledge.

Ó Súilleabháin, Mícheál. 2004. "Ceol na nUasal – Seán Ó Riada and the Search for a Native Irish Art Music." *Ó Riada Memorial Lecture* 15 (15): 1–20.

Rice, Timothy. 1996. "Toward a Mediation of Field Methods and Field Experience in Ethnomusicology." *Shadows in the Field: New Perspectives for Fieldwork in Ethnomusicology*, 101–120.

Ricoeur, Paul. 1981. *Hermeneutics and the Human Sciences: Essays on Language, Action and Interpretation*. Cambridge: Cambridge university press.

Satija, Mohinder Partap. 2013. *The Theory and Practice of the Dewey Decimal Classification System*. Elsevier.

Savage, Patrick E. 2018. "Alan Lomax's Cantometrics Project: A Comprehensive Review." *Music & Science* 1: 2059204318786084.

Schafer, Raymond Murray. 1969. *The New Soundscape*. Don Mills: BMI Canada Limited.

Seeger, Anthony. 1991. "Styles of Musical Ethnography." In *Comparative Musicology and Anthropology of Music: Essays on the History of Ethnomusicology*, 342–355. Chicago: University of Chicago Press.

Seeger, Anthony. 2006. "Lost Lineages and Neglected Peers: Ethnomusicologists Outside Academia." *Ethnomusicology* 50 (2): 214–235.

Shelemay, Kay Kaufman. 1991. "Recording Technology and Ethnomusicological Scholarship." In *Comparative Musicology and Anthropology of Music: Essays on the History of Ethnomusicology*, 277–292. Chicago: University of Chicago Press.

Smith, Thérése. 2005, February. "The Beautiful, the Broken-down, and the Half-forgotten: Songs for Singers." *Ó Riada Memorial Lecture* 17.

Smith, Linda Tuhiwai. 2013. *Decolonizing Methodologies: Research and Indigenous Peoples*. New York: Zed Books Ltd.

Stock, Jonathan P. J. 2003. "Music Education: Perspectives from Current Ethnomusicology." *British Journal of Music Education* 20 (2): 135–145. doi:10.1017/S0265051703005345.

Stock, Jonathan P. J. 2006. "Clues from Our Present Peers?: A Response to Victor Grauer." *The World of Music* 48 (2): 73–91. Accessed May 27, 2020. www.jstor.org/stable/41699697.

Stone, Ruth M. 2008. "Historical Research." In *Theory for Ethnomusicology*, 177–195. Upper Saddle River, NJ: Pearson Prentice Hall.

Vane, Olivia. 2018. "Text Visualisation Tool for Exploring Digitised Historical Documents." In *Proceedings of the 2018 ACM Conference Companion Publication on Designing Interactive Systems*, pp. 153–158.

Wood, Abigail. 2008. "E-Fieldwork: A Paradigm for the Twenty-first Century?" In *The New (Ethno)Musicologies*, 170–187. Lanham: Rowman & Littlefield.

Zemp, Hugo. 1978. "'Are'are Classification of Musical Types and Instruments." *Ethnomusicology* 22 (1): 37–67.