



# Automating the black art: Creative places for artificial intelligence in audio mastering



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## ABSTRACT

In this paper, we consider the impact of artificial intelligence (AI) in the creative economy of music production. One sector in particular, audio post-production, is experiencing rapid change due to AI and various other forms of automation. This spells major changes, now and in the future, for skills, employment and work. Many accounts on the role of machine automation in occupational instability—specifically, reductions in human employment—have focused on the manufacturing (assembly lines) and service (financial, legal and administration) sectors: so-called blue- and white-collar jobs. However, there are as yet only limited forays into the possible consequences of AI in the creative economy, in particular on ‘no-collar jobs’. Creative occupations were previously understood to be immune from the disruptions of AI due to the high levels of intuition, affective knowledge, ‘gut instinct’, and other human ‘assets’ difficult to replicate by complex algorithms and intelligent machines. Drawing on empirical research on AI in audio post-production, this article contends that there are conflicting notions of the possible impacts of these new innovations on human expertise and digital skills. The article highlights change underway in this profession of audio mastering as workers in the creative industries collaborate and compete with AI-driven technological innovation.

## 1. Introduction

You see, you found ways of breaking the rules and that’s why they called it the black art because people would say, how do you get that level on that record with that length? And I’m going, you know, I’m not telling. But there were just things we did to overcome the system. And every genre of music was different.

–(Interview, M, 60s, Mastering Engineer, 2017)

In 2014 the Montreal-based company LANDR launched an automated system for audio mastering catering to musicians, sound producers and film score composers. With the provocative slogan ‘A.I. From the heart’ the company promotes its use of ‘A.I. and machine learning (think self-driving cars and Shazam) to replicate the processes human engineers make when mastering a track’ (LANDR, 2018: no pagination). The Head of Product Design at LANDR articulates how the company’s system works:

Machines that do ‘deep learning’—like LANDR—are a form of advanced artificial intelligence (A.I.). They deal with large and complex sets of data. They’re capable of high levels of abstract understanding. They adapt. They learn how to learn ... The LANDR A.I. is

a new form of life that’s always seeking to understand sound and music better. It lives alongside us ... The LANDR A.I. depends on a human’s ability to arrange new sounds. If we all stopped making music tomorrow LANDR would die.

–(Thoreau, 2016: no pagination)

While the company is certainly not suggesting that their artificial intelligence (AI) is able to think about and have an experience of music and sound in the same way a human does, the provocation upsets long-standing ideals about the role of human expertise in the creative industries. AI here is projected as working alongside and with human experts in a new relationship that supports rather than substitutes for them. Such a viewpoint runs counter to mainstream notions in academic, industry and government foresight that AI will replace, through redundancy or cost-effectiveness, people’s jobs.

In this article, we consider the spatial aspects of AI in the creative industry of audio post-production. Our central research question is how does AI transform the geographical aspects of audio mastering, namely the studio spaces humans labour in and the wider places they connect to as artists and suppliers of creative expertise? Before we start, it is necessary to define what audio mastering involves. It is easier to

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demonstrate what audio mastering is rather than explain the process in words. To listeners mastered sound recordings are loud, impressive, familiar and inspiring. To sound creators the difference between un-mastered and mastered recordings is obvious to their ears. Moreover, there is an assurance a mastered recording will sound as originally intended regardless of the playback system.

The origins of the practice of audio mastering lie in the era prior to the spread of digital technologies into the music industry. Mastering arose in the era before mass-distributed sound was digitized when it was prone to unintended alterations due to the nature of the technologies and the variability of the skills of those entrusted with reproduction. So, what is it human audio mastering engineers do that is so difficult for machines to replicate? Nowadays, audio mastering engineers assist musicians and sound producers with bringing their productions to a wider audience and market according to set standards and conceptions of what is deemed normal in line with listeners' expectations and perceptions. In this sense, they are affective 'gate-keepers' who ensure the emotional content instilled in creative practice is as appreciable as possible. The term 'affect' is generally defined in human geography as referring 'to the wide range of registers—beyond sight, image, and word—in which humans interact with, make sense of, and experience the world' (Castree et al., 2013: 4).

A skill that appears to require the all-too-human attributes of critical listening, a socio-cultural awareness of musical taste and fashion, and a combination of scientific knowledge and gut instinct would presumably be immune from recent forays into AI. Yet, this is not the case. The recent emergence of AI in the music industry, a sector known for creativity and ingenuity, is both unsettling and beguiling for the audio mastering professionals who are the focus of the research in this paper. AI for audio production work is still in its infancy, yet already there are profound ramifications for creative spaces and places. AI in audio mastering is by its very nature challenging to human labour and the economic geographies of music and sound production since the algorithms draw on vast and growing databases of audio sourced from many origins in order to inform its decision-making, a feat no human expert could match.

AI then is spatially significant and of geographical interest. Over the term of its existence the occupation of the audio mastering engineer has been notably place-specific, grounded in studios and scenes, and embedded within the wider cultural infrastructures of the music industry. We argue that the geographical aspects of audio post-production are key to understanding how AI will become enmeshed in new assemblages of people and machines in creative endeavours rather than simply substituting directly for human expertise.

The paper's structure is as follows. The next section reviews the social science and geographical literature on AI, creativity and music. In the third section, we summarize the art of audio mastering and distinguish the skill sets required from related creative work. We pay particular attention in this discussion to the notion of affect in the work of professionals who uphold and regulate the qualities of mass distributed audio. In the fourth section, we then turn to assess the inroads AI is making into this creative work in the music industry and describe the gathering ubiquity of services acclaiming to offer more-than-human benefits. Throughout these sections of the article, we embellish the analysis with narrative extracts from semi-structured interviews with professionally listed and globally recognized audio mastering engineers, including a handful who have been in the industry for more than 30 years and are considered exemplars in professional circles. The empirical research also involved participant observation in nineteen studio spaces. We discuss two distinct types of place important to audio mastering engineers facing the emergence of AI: first, the studio; and second, the cultural infrastructures harbouring musical 'scenes', which provide clients and inspiration. We highlight how AI's affordances are discomfiting assumptions about place and its role in human skills. Shifts in the music industry more widely are also instrumental in providing windows of opportunity for AI to capture sections of the audio

mastering sector. Through close attention to the skills involved in mastering and the places enfolded into the process, we contextualize AI's geographical aspects and question recent assumptions about the roboticization and computerization of jobs.

## 2. AI in the creative industries

The debate over what constitutes AI is complex and complicated, but we start by noting the definition used by the UK Government in its Industrial Strategy White Paper: 'Technologies with the ability to perform tasks that would otherwise require human intelligence, such as visual perception, speech recognition, and language translation' (UK Government, 2017: 37). AI systems, we would add, include technologies in which computer systems sense their environment, think, learn, and react in response to such data-sensing. AI-driven technologies include both robots and purely digital systems that employ learning methods such as deep learning, neural networks, pattern recognition (including machine vision and cognition), reinforcement learning, and machine decision-making. A key concern in the social scientific literature on AI's future is whether humans will be made redundant by automation. Many sense that a 'jobless future' is on the horizon (Ford, 2015).

The widespread predictions of AI transcending humans in future is critiqued in some quarters as being the product of Judeo-Christian apocalyptic beliefs informing popular science discourses, a get out of jail free card from a litany of human-centric challenges (Geraci, 2010). Yet, where popular commentators and scientists are in agreement is that creative tasks continue to represent a 'bottle-neck' for AI lending some sectors an apparent sense of immunity from automation (Kaplan, 2016: 118). Language, creativity and emotion are something of a holy grail for AI to achieve 'general' intelligence, the acme of human intelligence (Boden, 2016). In spite of this there are now incursions of AI into creative industries. Before summarizing one case in particular in audio mastering, we next review the literature in geography on the creative industries and then move on to consider the digitalization of human labour in these sectors of the economy.

### 2.1. The creative industries

Research on the creative industries is a hallmark of this journal (c.f., Banks et al., 2000; He, 2017; Luger, 2017) as is spatial politics within the music industry specifically (c.f., Brown et al., 2000; Fraser and Ettlinger, 2008; Wang and Chen, 2017). Discarnate modes of business pose a conundrum since physical creative places—that is, the studio and scenes—are recognized by human geographers as 'relational spaces of creativity' where experts share knowledge and interact with peers and clients (Gibson, 2005). Descriptions of craft learning show imitation and routine is the remit of apprentices who having gained access to the workshop—that is, of the medieval gold-smith (Sennett, 2008) or, more recently, American cowboy boot-maker (Gibson, 2016)—learn skills osmotically and often in a way that is indistinguishable from other menial tasks. In audio mastering studios have traditionally functioned in a similar way to craft workshops as spaces for learning and succession.

Early on geographers became aware of the flexible structure of the creative industries, for instance film-making, which is made up of specialists across pre- and post-production services. Spatially concentrations of creativity in major cities, for instance Los Angeles, dispersed to suburbs nearby in the metropolitan fringe where property was more affordable and superior amenities available, for instance Hollywood (Christopherson and Storper, 1986). The fragmentation of large firms to clusters set apart from urban cores provided surplus employees for design, freelance writing, film, photography, new media and music. In countries such as Sweden creative industries experienced rapid growth in market size due to this fragmentation in the late twentieth century (Power, 2002). Geographical awareness of the music

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