# Follow the algorithm: An exploratory investigation of music on YouTube

Massimo Airoldi[a,*], Davide Beraldo[b], Alessandro Gandini[c]

[a] Department of Social and Political Sciences, University of Milan, via Conservatorio 7, 20122, Milan, Italy
[b] Department of Sociology, University of Amsterdam, Nieuwe Achtergrach 166, 1018WV, Amsterdam, Netherlands
[c] Media Department, Middlesex University, London, The Burroughs, Hendon, London NW4 4BT, United Kingdom

## ARTICLE INFO

## ABSTRACT

This article presents an exploratory study of the network of associations among 22,141 YouTube music videos retrieved by 'following' the platform's recommender algorithm, which automatically suggests a list of 'related videos' to the user in response to the video currently being viewed. As YouTube's recommendations are predominantly based on users' aggregated practices of sequential viewing, this study aims to inductively reconstruct the resulting associations between the musical content in order to investigate their underlying meanings. Network analysis detects 50 clusters of tightly connected videos characterised by a strong internal homogeneity across different axes of similarity. We discuss these findings with reference to the literature on music genres and classification, arguing that the emerging clusters can be considered as 'crowd-generated music categories'. That is, sets of musical content that derive from the repeated, crowd-based actions of sequential viewing by users on YouTube in combination with the platform's algorithm. Interestingly, 7 out of 50 clusters are characterised by what may be seen as a 'situational' culture of music reception by digital audiences. Such culture is not so much founded on music genres as traditionally conceived, but rather on the purposes of reception which are rooted in the context where this takes place.

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## 1. Introduction

The diffusion of a variety of Internet sources that allow for widespread access to music has had a significant impact on the cultures and practices of music reception as well as on the relationships among individual listeners, musical content and technology. Arguably, a prominent actor at the heart of this process is YouTube, the popular video streaming host owned by Google that is now a global repository for popular music and the entry point for a vast number of listeners-consumers searching for new music (Cayari, 2011; Thelwall, Sud, & Vis, 2012).

This article offers a contribution to the fields of popular music studies, cultural and media sociology by presenting an exploratory study of the network of associations among 22,141 YouTube music videos, as produced by the platform recommender algorithm (Celma, 2010). The aims of this study are to: a) reconstruct how musical content clusters together; and b) understand the meaning of these associations in order to learn about the aggregated practices of sequential viewing by YouTube users and the cultures of reception that surround such practices.

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* Corresponding author. Present Address: via Conservatorio 7, 20122, Milan, Italy.
  E-mail addresses: massimo.airoldi@unimi.it (M. Airoldi), d.beraldo@uva.nl (D. Beraldo), a.gandini@mdx.ac.uk (A. Gandini).

This work builds on the premise that the network of 'related videos' on YouTube is not merely a computational outcome. On the contrary, existing research demonstrates how it originates from the activity of YouTube users who spontaneously upload, tag and consume digital music – a process that is nevertheless technologically-mediated by the platform. YouTube features an automatic system that recommends 'related' videos of potential interest, based on site activity (Davidson, Liebald, & Liu, 2010: 293) – that is, in principle, an attempt at guessing users' musical tastes. Concretely, a list of related videos is normally shown to the side of any visualised content, and this strongly influences users' consumption pathways on the platform (Zhou et al., 2010). Despite the fact that the current exact formulation of the algorithm is not publicly known, previous contributions by researchers at Google (owner of YouTube) acknowledge how the set of recommended related videos is shaped by the collective behaviour of users, since the YouTube recommendation system relates similar videos mainly on the basis of the most frequent co-views (Bendersky, Garcia-Pueyo, Harmsen, Josifovsk, & Lepikhin, 2014; Davidson et al., 2010). Thus, since the 'relatedness' of YouTube music videos is, in principle, the outcome of users' aggregated viewing patterns, our research aims to 'follow' the platform's recommender algorithm in order to map and interpret resulting associations between different types of music.

From a theoretical perspective, this article aims to expand the sociological understanding of music classifications and genres. This topic has recently gained significant scholarly attention (see Beer, 2013; Lena & Peterson, 2008; Schmutz, 2009; van Venrooij, 2009; Santoro, 2002). However, it still lacks rigorous empirical investigation (Holt 2007: 8). In the sociological literature, music genres are commonly intended as "systems of orientations, expectations, and conventions that bind together an industry, performers, critics, and fans in making what they identify as a distinctive sort of music" (Lena and Peterson, 2008: 698). Far from being rigid and static, cultural classifications of genres are historical, contextual and fluid artefacts (DiMaggio, 1987; Lena & Peterson, 2008; Middleton, 1990); hence, according to DiMaggio, "the challenge for the sociology of art is to understand the processes by which similarities are perceived and genres enacted" (1987:441). This is particularly true now that online platforms have substantially restructured the ways in which music is distributed, discovered and consumed (Prior, 2014; Tepper & Hargittai, 2009). In a recent paper, sociologist David Beer discussed the role of online tagging, searching and recommendations in shaping contemporary music categorisation mechanisms, arguing that "cultural boundaries now appear more open to rapid and unconstrained drawing as a consequence of the media formats through which they are archived, ordered and obtained" (Beer, 2013: 153). Other scholars have similarly stressed the need for new methodological approaches capable of grasping the moving, fine-grained, relational complexity of music classificatory schemes in an inductive way (e.g., Savage & Gayo, 2011; Rimmer, 2012; van Venrooij, 2009). Online research represents an opportunity to step further in this direction. Moving from a critique to the use of standard qualitative and quantitative methods for the study of everyday forms of art categorisation, Beer (2013) suggests to take advantage of the enormous amount of user-generated data publicly available on social media for the study of 'ground-up' music reception patterns. Building on this methodological premise, this paper aims to map the associations between related music videos on YouTube, and to inductively explore music reception and classification among digital audiences.

The research methods used in this paper take inspiration from the 'digital methods' approach (Rogers, 2013), according to which we should 'follow the medium' to study cultural and social phenomena unfolding on the Web. This approach makes it possible to exploit the categories and procedures that digital platforms 'natively' adopt to organise information and structure individual behaviour for research purposes. Consequently, we 'followed' YouTube's related videos to derive a network of associations among music videos.

The empirical part relies on two techniques: network analysis (see Wasserman & Faust, 1994) and content analysis (Krippendorff, 2013). The former is used to analyse the above-mentioned network of associations, aggregating highly connected videos into distinct clusters and applying a so-called 'community detection' algorithm.[1] This allows us to analyse a 'second-order' network composed of clusters, instead of single videos. The second technique we use, content analysis, examines the occurrence of words in the title of a video, which is entered by users themselves. The interpretation of the most recurrent words in each cluster allows us to infer, in cases of a strong coherence between them, the music genres associated with these clusters 'from the bottom-up'.

Although the effects of the YouTube algorithm on our results remain factually impossible to check (given the undisclosed nature of the algorithm itself), we present what we believe is a unique overview of digital music reception and platform cultures that is, admittedly, exploratory in nature, but has significant potential for replication.

The harvesting of the associations in our relational dataset reveals the existence of 50 clusters of YouTube music videos. The features of this clustering present significant elements of interest for both cultural sociology and the study of music audiences. We argue that these clusters can be considered *crowd-generated music categories* – that is, sets of musical content that are generated by the repeated, crowd-based individual activity of users on the website (see Striphas, 2015). These sets represent aggregated data on the "perception of style and meaning" (Frith, 1996: 94) by digital music audiences on YouTube, which can be seen as products of crowd-generated principles of similarity.

We will discuss our findings and in particular highlight two elements worthy of closer attention. First, assuming that these clusters actually represent crowd-generated music categories, we show how they partially overlap with existing music

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[1] Community detection is a network analysis technique that attempts to identify sub-groups of nodes that are internally denser and externally less dense (see Blondel, Guillaume, Lambiotte, & Lefebvre, 2008). In our case, it converts the full network into a small number of clusters, each one composed by videos that are strongly associated.