Agent, Gatekeeper, Drug Dealer: How Content Creators Craft Algorithmic Personas

EVA YIWEI WU, University of California, Berkeley, USA

EMILY PEDERSEN, University of California, Berkeley, USA

NILOUFAR SALEHI, University of California, Berkeley, USA

Online content creators have to manage their relations with opaque, proprietary algorithms that platforms employ to rank, filter, and recommend content. How do content creators make sense of these algorithms and what does that teach us about the roles that algorithms play in the social world? We take the case of YouTube because of its widespread use and the spaces for collective sense-making and mutual aid that content creators (YouTubers) have built within the last decade. We engaged with YouTubers in one-on-one interviews, performed content analysis on YouTube videos that discuss the algorithm, and conducted a wiki survey on YouTuber online groups. This triangulation of methodologies afforded us a rich understanding of content creators' understandings, priorities, and wishes as they relate to the algorithm. We found that YouTubers assign human characteristics to the algorithm to explain its behavior; what we have termed *algorithmic personas*. We identify three main algorithmic personas on YouTube: Agent, Gatekeeper, and Drug Dealer. We propose algorithmic personas as a conceptual framework that describes the new roles that algorithmic systems take on in the social world. As we face new challenges around the ethics and politics of algorithmic platforms such as YouTube, algorithmic personas describe roles that are familiar and can help develop our understanding of algorithmic power relations and potential accountability mechanisms.

CCS Concepts: • **Human-centered computing** → **Computer supported cooperative work**.

Additional Key Words and Phrases: Algorithmic Persona; YouTube; Metaphor; Folk Theories; Content Creators

ACM Reference Format:

Eva Yiwei Wu, Emily Pedersen, and Niloufar Salehi. 2019. Agent, Gatekeeper, Drug Dealer: How Content Creators Craft Algorithmic Personas. *Proc. ACM Hum.-Comput. Interact.* 3, CSCW, Article 219 (November 2019), 27 pages. <https://doi.org/10.1145/3359321>

1 INTRODUCTION

Time's magazine chose YOU as the person of the year in 2006 to recognize the work of millions of hobbyist content creators with the revolutionary potential to “wrest power from the few,” and to “change the way the world changes” [35, 86]. More than a decade later, the reality is more complicated. Increasingly, content creators navigate a new type of algorithmically mediated worker-employer/platform relationship as algorithms largely decide what content to promote and what to take down. In this paper, we focus on YouTube and seek to learn how YouTube content creators (YouTubers) make sense of the YouTube algorithm and the roles the algorithm plays as well as what roles YouTubers want the algorithm to play.

Authors' addresses: Eva Yiwei Wu, eva.wu@berkeley.edu, University of California, Berkeley, Berkeley, California, USA; Emily Pedersen, University of California, Berkeley, Berkeley, USA, epedersen@berkeley.edu; Niloufar Salehi, University of California, Berkeley, Berkeley, USA, nsalehi@berkeley.edu.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than the author(s) must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from permissions@acm.org.

© 2018 Copyright held by the owner/author(s). Publication rights licensed to ACM.

2573-0142/2019/11-ART219 \$15.00

<https://doi.org/10.1145/3359321>

We focus on YouTubers because of their particular position in relation to a widespread, real-world algorithm that impacts their work. Most hobbyist YouTubers are not paid for their work. A path to professionalization and monetization exists which requires first becoming popular on the platform – as decided in large part by the algorithm [19]. To navigate these conditions, YouTubers have created, over the last decade, online and in person communities that they use to share tips and engage in mutual aid and collective sense-making. This collective sense-making is challenging because YouTubers do not have direct access to the technical aspects of the algorithm [33]. Additionally, the algorithm does not always follow predictable patterns and frequently changes with unannounced experiments [29]. On the other hand, YouTubers interact directly and intimately with the algorithm on the ground and have high stakes involved. Therefore, they have a unique vantage point to understand what the algorithm does in practice.

To gain a deeper understanding of how YouTubers make sense of the algorithm, we took two main approaches: directly through interviews and a survey and indirectly by analyzing existing information [36, 81]. First, we asked YouTubers to reflect on their understanding of the algorithm in interviews and distributed a wiki survey on YouTube online groups [76]. We used sketches and alternative designs as provocations to elicit reactions from our interviewees about what the algorithm does and what they would want it to do. Second, we sought to find people where they are by analyzing native formats of information sharing. We watched videos of YouTubers talking about the algorithm on the platform. We reviewed information available online about VidCon, the major convention for YouTubers as well as forums and subreddits where YouTubers discuss their work with each other.

We found that YouTubers largely make sense of the algorithm by *crafting personas for it and viewing it as an actor: with goals, tastes, histories, and attitudes*. We categorized our themes into three major personas that repeatedly came up: Agent, Gatekeeper and Drug Dealer. An Agent is someone who manages and helps the creator in their work by finding an audience for them and promoting them. A Gatekeeper is someone who stands between the creator and viewers and decides who gets through. A Drug Dealer has one (often nefarious) goal: keeping viewers hooked on the platform for as long as possible. YouTubers use these personas to make sense of actions that the algorithm takes and to orient themselves towards the algorithm or sometimes to work against it [33]. Our finding builds on and extends prior research invoking folk theories [20, 25, 69] and metaphors [30] in users' understandings of algorithmically curated social media feeds.

Algorithmic personas are a conceptual framework that YouTubers use to make sense of the algorithm. We can in turn use those personas to develop our own understanding of what algorithms *do* in the world. We can ask questions about people's relations with those personas including power relations, accountability, and legal recourse. For instance, a drug dealer is viewed in society as potentially harmful because of the addicting nature of drugs and the public harms associated. From this perspective, there is precedent for policy in favor of public health. Additionally, talent agents have a long history in media production [42]. Because of the power that agents have over their clients, they often have legally binding contracts. Can you sign a contract with an algorithm?

2 RELATED WORK

This work relies on three major research areas: 1) the study of algorithms and people including algorithmic folk theories of social media feeds and societal effects of algorithms; 2) research on content creators on YouTube and their relations to platforms and algorithms; 3) prior work on the societal effects of algorithms that manage work.

2.1 Algorithms and People

As algorithmic systems have increasingly entered peoples' lives, researchers have studied the relationships between users and these systems and have proposed a number of frameworks and methodological approaches for understanding these relationships. We build upon research on how users develop folk theories of algorithmic systems and on research arguing for critical algorithm studies that theorize algorithms within or as culture.

2.1.1 Algorithmic folk theories of social media feeds. Social media feeds were one of the first large scale algorithmic systems in which people interact with the algorithms directly and daily. Therefore, one body of research within HCI focuses on folk theories or users' "lay understandings" of algorithmic social media feeds such as Facebook and Twitter [20–22, 25, 30]. This research has found that many people first noticed the existence of an algorithm when their expectations were violated [69] and in response, they constructed theories about the factors that they thought were important for the algorithm in prioritizing content [25, 26].

French and Hancock contributed a method for eliciting metaphors for the Facebook and Twitter feeds via wiki surveys and consequently constructing folk theories based on factor analysis of the metaphors gathered [30]. This study found a number of folk theories held by users for the Facebook and Twitter feeds. While this research did not explicitly discuss personas as a distinct type of folk theory, the Facebook feed theories included a number of personas such as: personal shopper, bouncer, spy, stalker, and investigator and the Twitter feed theories included two: bad assistant, and nosy mother.

Researchers have also used folk theories as a frame to study other phenomena surrounding social media feeds. A study of backlash to a rumoured new algorithmic feed on Twitter found that people theorized a number of abstract and operational theories about how the proposed algorithm might work [21]. A study of how self presentation on social media is complicated by algorithmic feeds found that folk theories were formed using diverse sources of information and were more complex, multi-faceted, and malleable than previously assumed [20]. This research posits that the folk theory formation process starts with information foraging, followed by sense-making (including social sense-making), and ends with the formulation of folk theories [20]. We found the same dynamic in our work.

While there is much that this body of research shares, there are differences in precisely how folk theories are defined and used [22]. Some of this research views users as "folk" or "non-professionals" whose conceptual understandings stand in contrast to the "institutionalized, professionally legitimated conceptions held by experts and system designers" [25]. Others have insisted that the framing of folk theories do not assume that users hold faulty theories that need to be corrected [30]. In all cases, researchers have emphasized that users' intuitive theories about how social media feeds are composed affect their behaviors on those platforms [25, 30, 69]. Researchers have also argued that user behaviors, influenced by their folk theories of the platforms, in turn become input that feeds back into the algorithms and thus forms a feedback loop [69]. Therefore, motivations to study folk theories within HCI are to design better systems that communicate useful theories of how they work to users, to increase trust in the systems by avoiding expectation violation [25, 30, 69], and to intervene in a potentially vicious feedback loop [69].

We build heavily on this work but take a slightly different angle: by focusing on algorithms as socially constructed objects [81], we seek to learn more about the roles that they play in the social world. In this view, people – whether designers, software engineers, content moderators, users, content creators, public relations employees, etc. – collectively construct the meaning and role of the algorithm albeit from different perspectives and with different levels of access to code, data, and lived experiences. In our work, we found that content creators made sense of what the

algorithm does by personifying it, so we sought to better understand those personas as a window to the social roles that the algorithm plays.

2.1.2 Critical Algorithm Studies. Another related area of research that has been referred to as critical algorithm studies [81] spans a number of disciplines including anthropology [24], communication [15, 33], humanities [84], sociology [44], and science and technology studies (STS) [81] with different views on how algorithms should be studied and even on what they are. Dourish puts forward one direction in algorithmic studies which is to view algorithms as objects of professional practice for computer scientists and software engineers and to distinguish them from other non-algorithmic components of technical systems [24]. Bucher proposes the notion of “algorithmic imaginaries” as the way in which people imagine, perceive, and experience algorithms and stresses that these imaginaries should not be viewed as false beliefs but rather as the very real ways people experience algorithms. In a study of the Facebook algorithm, Bucher uses the theoretical lens of affect and discusses how algorithmic imaginaries not only influence users’ subsequent behaviors but also their moods and feelings [13].

In our research, we found YouTubers using the words “algorithm” and “YouTube” interchangeably when referring to the recommendation algorithm, the platform, or sometimes even the company. Therefore, we found Seaver’s conception of the algorithm as a social construct an appropriate framing to explain our findings. Seaver argues that it is not the narrowly defined technical algorithm that has sociocultural effects, but the algorithmic system: a dynamic arrangement of people and code [80, 81]. This angle views the algorithm as a mix of human decisions and mysterious inner workings of the code that can be studied ethnographically. As the phrase “algorithm” has entered public discourse, its meaning has inevitably changed to meanings other than a strict definition of a technical algorithm. How researchers should work with this fluid meaning is an open question. Here we chose to reflect the language that YouTubers used, since understanding their conceptions of the algorithm is the focus of the study.

2.2 Creating Content on YouTube

Prior work on YouTubers has highlighted the factors that contribute to celebrity YouTubers’ popularity: originality, charisma, collaboration with more popular YouTubers, and luck [37]. Other research has focused on micro-celebrity content creators. For example, research on popular beauty bloggers has analyzed the algorithm’s effect on driving a hegemonic gender identity and on facilitating unfair levels of visibility among certain categories of video bloggers [10]. Furthermore, prior research on YouTube content creators has explored their relationship with multi-channel networks [31], their motivations and strategies [12], their user agency as a nuanced and multi-faceted concept [86], their real-life impact on teenagers [89], and a comparison of young YouTubers to adult and professional YouTubers [61].

A large body of research has studied the relationship between YouTube and online communities [23, 49, 55, 56, 74, 90]. A sense of community exists among YouTubers even though the structure that one would expect in a traditional online community is lacking on YouTube, whose primary offering is a repository of videos rather than a social networking site. Researchers have argued that individual connection is sufficient to create a sense of belonging among YouTubers [74]. One study of DIY home repairers’ practices of consuming home improvement videos on YouTube found that viewers lacked understanding of information-tailoring by the YouTube algorithm. The algorithm narrowed information and molded viewers’ self-identities towards homogeneity [90]. All of these studies related to YouTube and its online communities highlight the affordances of YouTube to connect like-minded people who would have otherwise not been connected without the platform.

In this work, we focus on the YouTube platform and in particular on content creators. The goals of YouTube content creators are often divergent from regular social media users and they often have much more at stake on the platform. For instance, one of the top three goals for a Facebook poster is to not rock the boat [20]. In contrast, the YouTubers we interviewed expressed the need to stand out in an over-saturated sea of content and relied heavily on the algorithm to help them do so.

2.3 Algorithms that Manage Work

Another related area of research has investigated algorithmic management and human workers' relations to algorithms that take on the role of allocating work or mediating worker-platform relationships [38, 53]. This research on how proprietary and opaque algorithms affect micro-entrepreneurs focus on industries such as ride-sharing [53], arts and crafts [45] and hospitality [39]. For instance, ride-sharing algorithms allocate work to drivers and effectively redistributed uncertainty from the platforms to the workers [53]. Creative entrepreneurs use platforms such as Etsy to work beyond the gatekeepers in the traditional creative world, yet comprehension of the algorithm and profitability on those platforms remain elusive [45]. Finally, Airbnb hosts work to make sense of its algorithm and have to cope with frustration and anxiety from the opaqueness of the algorithm that determines their income [39]. We build on this work to study how YouTube content creators make sense of the algorithm and how they would like to change it.

3 STUDY DESIGN

Our goal is to understand how content creators make sense of the YouTube algorithm's roles and what they would want those roles to be. We chose to focus on hobbyist YouTubers, which we defined as those actively producing content for YouTube and who have fewer than 1 million subscribers. This covers the majority of YouTube content creators. Reaching 1 million subscribers acts as a rite of passage for celebrity status on YouTube with websites devoted to tracking the YouTube "millionaires" [1]. YouTubers with higher subscription rates also often have access to management and consulting services through Multi-Channel Networks (MCN) that help with programming, production, and promotion [19]. Therefore, we focus our analysis on hobbyists creating content across a range of topics who interact directly and intimately with the algorithm.

3.1 Our Method and Position

We began this research not as objective outsiders but as people with an interest and investment in how the YouTube algorithm could be made more fair or just. What exactly fairness and justice mean in this context is not clear and begs the question: for whom? In recent years, researchers have called for increased algorithmic fairness, accountability, and transparency¹ [64, 82, 85]. Crucial in these conversations is engagement with the people most affected by these algorithms [26, 53]. Understanding people's viewpoints, values, and priorities is essential to focus calls for more fairness, accountability, and transparency in ways that matter to the people with the most at stake. Here we focus on YouTube and ask: How do content creators make sense of an algorithm that impacts their creative work and how would they want to change its role?

Therefore, this was not a question of access to precise algorithmic procedures or the study of equity in the distribution of resources, but rather an effort to situate the effects of algorithms on people and understand how they make sense of and respond to those effects [21, 52, 81]. Building on prior work, we study algorithms in this context as "heterogeneous and diffuse sociotechnical

¹The ACM Conference on Fairness, Accountability, and Transparency (ACM FAT*) was founded in 2018.

systems” and study them with an ethnographic sensibility [11, 81, 83]. Here we describe the characteristics of our approach.

Ethnographic research typically includes field work in a natural setting, a holistic view of activity, a descriptive approach, and an emphasis on the member’s point of view [11]. We rely on this sensibility particularly in the descriptive nature of our analysis and in our emphasis on YouTubers’ points of view. Seaver proposes a number of tactics for the ethnographic study of algorithms, of which we rely on two [81]: Scavenging for information from multiple dispersed sources and treating interviews as field work.

Rather than engage in lengthy ethnographic fieldwork we chose to follow techniques of rapid ethnography that provide a reasonable understanding of users and their activities in a shorter time period [62]. Rapid ethnography is an established framework in HCI research [62] and its techniques include: 1) Focus research question and use key informants: We narrowed our focus to the relation between YouTubers and the algorithm. Instead of open-ended interviews and observation we conducted “condensed ethnographic interviews” [7]. We also gathered data from key informants in YouTuber conferences and through searching on YouTube itself for native formats of information sharing [63]. 2) Interactive observations: we used card sorting and paper prototyping in our interviews to elicit reactions. We also used wiki surveys to gather information from a larger group of YouTubers [76]. Triangulation of data collection methods is a common approach in rapid assessment methodology [8]. 3) Collaborative and iterative data analysis: Our team met regularly in the research process and analyzed and discussed the data together [8].

We also rely on a body of prior work that leverages design not just to provide a solution, but to provoke critical thinking of a socio-technical issue (see [46, 66, 91, 92]). For instance, researchers have outlined the following purposes of design in the context of privacy by design: to solve a privacy problem, to inform and support privacy, to explore people and the situation, and to critique, speculate or present critical alternatives. Eslami et al. used alternative views of the Facebook News Feed to elicit folk theories from interview participants [25]. In our study of YouTubers, we leveraged design sketches that embed alternate ideals to foster discussions about values, priorities, and ethics. The goal of design probes is to explore the world as it could be, as opposed to only focusing on the world as it is now [46, 91]. In the next sections, we describe our process of data gathering and analysis.

3.2 Data Gathering

We gathered data in two main ways: directly in interviews and a wiki survey, and indirectly through content analysis. This triangulation of methodologies enabled us to verify our findings with more confidence by both eliciting reactions from people and sometimes probing them to go deeper, as well as meeting people where they are and analyzing organic conversations in the context of the study [65, 81].

3.2.1 Interviews. We began our study by conducting interviews with local hobbyist YouTubers. This enabled us to establish a basic understanding of their attitudes toward the algorithm and to deepen that understanding by asking questions and probing through card sorting and speculative design exercises. At the end of our study, we sought to validate our findings with a larger group and used a wiki survey that we distributed on YouTuber forums and subReddits [76].

We conducted the interviews from October to November 2019. We found participants in three ways: First, our personal connections (5 participants). Second, we searched YouTube for content related to our university and reached out to the content creators (3 participants). Third, we posted a notice on our university’s various Facebook pages. We recruited one person from our Facebook post and reimbursed them with \$10 for their time. We interviewed a total of 9 people (6 male,

3 female; 3 White/Caucasian, 3 Asian, 2 South Asian, 1 Hispanic; aged 18 to 30, $M = 21$). Our interview participants had an average of 5 years creating YouTube videos and ranged from posting content weekly to yearly on their channels. As of December 2018, our participants had between 56 to 257,000 subscribers (average=38,100, median=4,950). Most of our participants primarily make “lifestyle videos” with one participant making music videos.

Interviews were either held on a university campus in the US or via Google Hangouts when in-person was not possible. Each interview took around one hour to complete. We audio recorded and transcribed all interviews. Our interviews were semi-structured and centered around the following questions:

- How do content creators make sense of the YouTube algorithm?
- How do their perceptions of the algorithm affect their decisions and actions?
- If they could, what would YouTube content creators change about the algorithm?

One of the challenges that we faced in our interviews was prompting participants to dig deeper into how they make sense of the algorithm beyond the surface level features that they imagined the algorithm cares about (e.g. thumbnails). Part of the reason was that algorithms have very recently entered mainstream conversation and the conceptual tools for people to describe their effects have not yet been developed. The problem became even more challenging when we asked people to imagine alternatives. Traditions of participatory design teach us to engage users in the design process [79]. Speculative design allows us to overcome opacity stemming from corporate secrecy and instead imagine what we would want an algorithm to do. But it is not clear how to engage people when opacity is a fundamental characteristic of algorithms [14]. How might HCI researchers engage with stakeholders about the effects of seemingly invisible algorithms?

One exercise we used was card sorting [20]: Participants sorted features that the YouTube algorithm cares about by speculating their importance (e.g. thumbnail, click through rate, length of video, etc.) and added features they believed to be important that we had missed. After, we asked participants to re-sort the features by how they would want the algorithm to operate. We did this exercise after asking our initial questions and before showing and discussing prototypes. The card sorting exercise proved to be an effective ice breaker. It met participants at the level that they usually are when discussing the algorithm and eased them into a more complicated and abstract discussion of the algorithm’s goals and behavior and toward imagining alternatives.

In absence of a physical representation of an algorithm to point to and discuss, we chose to create physical representations of *algorithmic effects*. This is close to the ways that people actually experience algorithms in the real world. Eslami et al. took a similar approach [26]. They made study participants aware of the existence of algorithms in their Facebook News Feed by creating an alternative feed that did not have algorithmic selection. We extended this approach and invited participants to analyze and change what the algorithm does: After our first three interviews, we created prototypes of alternative YouTube front pages and recommendation tabs that addressed matters our interviewees had discussed (see Figure 1). We continuously adapted these prototypes and made new ones based on our interviews. The goal was not for us to create the best possible YouTube algorithm, but to use design as provocation to elicit reactions from our interviewees. We used our designs to prompt participants to imagine a different YouTube and learn how they form understandings of how a new algorithm operates and affects them.

3.2.2 Content Analysis. Our second source of data was native formats of online information sharing [63]. We watched videos of YouTubers talking about the algorithm on the platform, mostly with the goal of explaining it to other content creators. Additionally, we reviewed information available online about VidCon, the major convention for YouTubers and YouTuber forums (e.g. yttalk.com) and subreddits (e.g. /r/NewTubers, /r/YouTubeCreators, and /r/PartneredYoutube).

Fig. 1. Three of the alternative designs we used in our interviews. Each design was a provocation into a different way that the algorithm could work, showcased by what videos it would recommend under those conditions. The conditions are 1) Viewers are only recommended “smart” or educational videos. We created “Smart Mode” as a provocation in response to interviewees’ complaints about the “dumb” content that the algorithm promotes. 2) Viewers are shown content they don’t normally click on. We created “Diversify” mode because interviewees expressed the wish to escape the rabbit hole effect of the algorithm. 3) Promotes videos that YouTube human curators, who select for more artistic content, have chosen. We created “Curators Choice” as an alternative algorithmic design in response to interviewees’ frustration of the algorithm’s rigid pursuit of clicks and watch time and its lack of sensibility to artistic and tasteful values.

We analyzed YouTube videos of YouTubers speaking about their understanding of the algorithm. Two members of our team searched YouTube for the phrases: “YouTube algorithm”, “YouTube algorithm explained”, “YouTube algorithm hack”, and “YouTube algorithm rant.” We used two criteria for choosing videos 1) it must be produced by a hobbyist content creator (as we defined as someone with under 1 million subscribers) 2) describe an individual’s understanding and perception of the algorithm, not just known technical details. We watched videos, took detailed notes and quotes, and exchanged our findings frequently until we reached theoretical saturation. In total, we watched 245 minutes of content, across 11 unique creators. As of April 2019, these creators had between 11,000 to 646,758 subscribes (average = 264,432, median = 221,000).

We also analyzed information available online about VidCon - including the programs and recorded sessions about the algorithm. Vidcon is an annual video conference started by popular YouTubers and brothers Hank and John Green in 2010. It has since grown to an international convention where thousands of YouTubers meet yearly in the US, Australia, and the UK. VidCon is an opportunity for creators to meet each other in person, learn from successful YouTubers, and gain insider secrets from industry leaders.

3.2.3 Wiki survey. Finally, we sought to understand how much each of the themes that we had found resonated with a larger group. We used a wiki survey to do so [30, 76]. A wiki survey is a collaborative form of survey in which participants are asked to collectively rank a set of ideas. At each point a participant is presented with two competing ideas, in our case two themes of algorithmic personas, and asked to choose which one they agree more with or to add a new one. We launched a wiki survey based on the results of our field work and posted it to YouTuber forums and subreddits in March 2019. We asked survey takers to vote on what roles they believe the YouTube algorithm plays, and to add new roles as well.

3.2.4 Limitations and Opportunities. The goal of this research is to understand how hobbyist content creators make sense of the YouTube algorithm. One limitation of our method is that we conducted our initial set of interviews with YouTubers who we had access to. This biases our sample to younger content creators (aged 18 to 30) in our local area who primarily made lifestyle videos and whose prior experiences with digital platforms and algorithms might not be representative of the larger YouTube population. In addition, our sample is loosely affiliated with our university, which might have, for instance, increased the wish on the part of our study participants for the algorithm to play an educator's role as discussed in the "Algorithmic Wishes" section later in the paper. In the later stages of our research, we sought input from a wider range of content creators via content analysis of YouTube videos and our wiki survey. Future work can evaluate these findings with representative samples in surveys and longitudinal studies.

3.3 Data Analysis

We engaged in an iterative and collaborative process of inductive coding to extract common themes that repeatedly came up in our data. After completing the interviews, we met weekly and discussed themes and concepts as we continued our fieldwork. We conducted a categorization exercise in which we physically laid out themes and relevant quotes into emerging categories. Some of our initial categories included attitudes and feelings towards the algorithm, content creators' behaviors, their mental models, and algorithmic fairness. We used Dedoose, an online tool for open coding, to map data onto these categories. Each of two first authors independently coded half of the data. Through the open coding phase, the category of content creators personifying the algorithm was the most pervasive, occurring in all of our transcripts.

To analyze responses from our wiki survey, we used the analysis function on allourideas.org which we also used to collect the data. We posted the wiki survey on the subreddits: /r/NewTubers, /r/YouTubeCreators, and /r/PartneredYoutube, as well as the YouTube forum: YTalk and a Facebook group: Small YouTuber Zone. As of April 4th, we received 572 total votes, and 43 unique voters. We seeded the poll with 6 themes from our field work and participants added 6 new ones. The analysis process uses responses to construct an opinion matrix, and summarizes that matrix to calculate the probability that any one response would be chosen over a randomly chosen option [76]. This is the standard method for analyzing wiki surveys in prior literature [30].

4 BACKGROUND

We asked participants about their work on YouTube, including how they started and what motivated them. In this section, we paint a picture of the context of these YouTubers' work. Quotes from YouTubers we interviewed will be denoted by P1, P2, etc. and quotes from YouTube videos will be denoted by Y1, Y2, etc.

4.1 Motivations

We found that our interviewees' sought a sense of community; desired fame and financial gain; and shared their creative work to empower viewers like them. We briefly describe each in turn.

4.1.1 Building community. In a number of ways, creating content on YouTube is a deeply social act. Interviewees mentioned making YouTube videos to strengthen bonds with friends:

"It was just for fun to do with friends, then as I got into high school it became an actual activity to do with friends to get together to specifically make videos. It was like a bonding activity and that's kind of why I stayed involved in it." (P1)

Others shared their interests with peers online and made new connections:

"I have met a few friends through it, other musicians but none of the big YouTubers." (P5)

This resonates with prior research on how YouTube acts as a social platform both supporting existing connections in the offline world and enabling users to form new connections that otherwise would not exist [49, 56]. It was also through these online communities with other creators that many YouTubers came to make sense of the algorithm and craft algorithmic personas, which we will discuss in the next section.

Our participants also sought to make social connections with their audience and viewed online interactions as a way to express care and interest in a person or topic:

“I have to put in the time and effort and I hope that people see it. I know the people that comment on my videos leave it because they care and that they genuinely find my stuff valuable.” (P3)

Prior work has also characterized sharing and interacting with online content as commitments to maintaining social relationships [23, 56]. YouTubers feel a sense of belonging to a community, whether or not this sense of belonging is accompanied by explicit connections which are perhaps more common in other social networks [74]. However, sometimes connections did become explicit when someone in the audience reached out and that was a reason for making videos: “because I liked to be reached out to by whoever found inspiration in my videos.” (P3)

4.1.2 Fame and financial gain. Some creators sought to become popular on YouTube, what has been termed micro-celebrity status [43, 60]. Sometimes their ultimate goal was to make YouTube their career, and hoped to earn millions of dollars as a top-subscribed content creator or at the very least make a decent living from the work. Creators also use YouTube as a way to advertise their creative work and boost their offline career:

“I wanted to gain exposure, to get my music out there [...] it’s hard for musicians to get exposure, to get gigs, performance opportunity and monetary opportunities.” (P5)

4.1.3 Sharing, educating, and empowering. Some of our interviewees expressed altruistic reasons for sharing creative content on YouTube. Prior work has also found this dynamic within DIY content sharing communities where posters do not expect monetary return and their behavior is reminiscent of gift economies [54, 56]. In the face of high volumes of what our interviewees saw as clickbait or harmful content on YouTube, some expressed the need to create positive content and share their personal struggles to empower others who might be facing similar difficulties [55].

“[I post about] something that I struggle with mentally and emotionally that I think other people could benefit from or value [...]. Me and my friends have been talking about mental health recently. We are seniors, we don’t know what the hell we want to do with our lives [...]. That’s a really hard reality to approach, so I’m going to make a video about why trying new things is beneficial, because I want to convince myself of that and it’s a journey I want to take and I want to encourage and inspire other people to do the same.” (P3)

The impact of sharing on YouTube has been shown on identity building for LGBTQ youth [18] and young Muslim women in the US [58].

These were some of the more commonly mentioned motivations for creating content on YouTube. Others wanted to document their life memories, simply enjoyed the process of making videos, or practiced practical skills such as public speaking by making videos on YouTube. These motivations often overlapped or shifted over time.

5 ALGORITHMIC PERSONAS

Our research provides strong evidence that content creators make sense of the YouTube algorithm through three distinct personas: Agent, Gatekeeper, and Drug Dealer. They invoke characteristics

Table 1. Algorithmic personas of the YouTube video recommendation algorithm. For each of the algorithmic personas that we found, we summarize our findings on what the persona describes, how people behaved when they invoked it, and what role they wished the algorithm played. It is important to note that the personas as well as the algorithmic wishes are not completely distinct and often overlapped.

Persona	Description	Common Behaviors	Wishes
Agent	procures employment for YouTubers	befriend the agent	Advocator, Diversifier
Gatekeeper	determines whether YouTubers' content get viewed	bribe the gatekeeper, or try to fit in, or circumvent the gatekeeper	Impartial Judge, Diversifier
Drug Dealer	keeps viewers addicted to the platform	rebel against the drug dealer, or become complicit in drug dealing	Educator, Artistic Curator, Content Janitor

Table 2. Algorithmic Persona descriptions gathered from our Wiki survey. For each algorithmic persona, we list three to five descriptions that categorize that persona. Each description has a score from 0 to 100 assigned to it through a wiki survey we ran on All Our Ideas (www.allourideas.org). We seeded the wiki poll with descriptions of persona gathered from our interview data. Descriptions marked with a * sign were added by participants in our poll.

Persona	Description	Score (1-100)
Agent	A partial judge that will decide if your video will get promoted or not*	66
	A restrictor of creativity fueled by the ever changing community guidelines*	35
	A talent manager that helps the content creator grow their channel	26
	A regulator who makes sure people don't grow too quickly on the platform*	26
Gatekeeper	A curator that decides what will and will not be seen by the viewers*	73
	An explorer that helps viewers find relevant content	58
	A gatekeeper between the content creator and their viewers	56
	A prejudged supplier of content you may or may not be interested in	49
Drug Dealer	A strategist for increasing user engagement with the platform*	60
	An impartial judge that scans your preferences and gives you more things to watch*	47
	A drug dealer that encourages viewers to stay on the platform	47
	A gambler betting on videos for the most views	39

of these personas when managing their relations with the algorithm, rationalizing algorithmic outcomes, deciding on courses of action, and engaging in conversations with other content creators. Table 1 shows an overview of our findings which includes descriptions of each persona, how people behaved around them, and what they preferred the algorithm to do. In this section we will explore the shapes of these personas, their characteristics, and specific instantiations of their use (summarized in Table 1). Table 2 shows themes that we found for each persona and scores that content creators assigned to them in the final wiki survey. We also differentiate an algorithmic persona from a real world human role by capitalizing the word Agent, Gatekeeper, or Drug Dealer. After describing the personas, we will end with a discussion of how personas can guide both the design of algorithmic systems as well as our understanding of the roles algorithms play in the real world and their politics and ethics.

5.1 Algorithm as Agent

When invoking the persona of algorithm as Agent, content creators focused on the algorithm as it relates to them personally, similar to a talent agent. An agent is a familiar role for creative professionals. The most distinct characteristic of the algorithm as Agent is that it is perceived as scanning, choosing, and promoting individual people's channels:

*"The YouTube algorithm **blessed** Emma's soul because I don't even know."* (Y6)

When an agent-talent relationship is successful, the agent supports the talent by providing them with coveted gigs and the means to grow. In the same way, the algorithm as Agent supports a creator by showing a creator's content to large audiences and by building a bigger following for them:

*"YouTube will **favor** you in the algorithm which would then lead to more views and more subscribers."* (Y1)

Some viewed the algorithm as a benevolent Agent seeking the highest quality work:

"At its core, the goal of the algorithm is just to find the highest value videos." (Y3)

5.1.1 Creative Freedom. The value of artistic or creative work is subjective and an agent often follows their intuitions in selecting which talent to promote. Thus, the decisions of the algorithm as Agent can seem whimsical, irrational, or incomprehensible:

*"[The algorithm is a] mystical thing that has a way of picking what videos pop up on recommended page or if people search for your videos, [the] algorithms decides which video comes up first. [...] Don't know how it works. Some channels have meteoric growth, not clear why that channel **was chosen**."* (P2)

An age old tension between artists and their agents has been the freedom of artistic expression. Similarly, one of the aspects that creators wanted in the algorithm as Agent was allowing them to pursue their passions freely. The algorithm as Agent is sometimes seen as allowing creators to make content they enjoy:

*"This algorithm at least **allows** me to make whatever content I want."* (P4)

In other cases, creators complained about having to transform their work style to fit into the Agent's tastes and expectations:

*"The algorithm **forces** you to constantly produce content. So you can't be like I'm going to do a short film and take a break for like a month and a half because short films take time. You can't do that. You are going to lose hundreds of thousands of followers and you are not going to make money."* (P1)

Content creators described the tensions inherent in any talent-agent relationship and their efforts to stay true to their identity:

"I'm not trying to sell a text or thumbnail or type of video that is going to go viral but more trying to sell who I am as a person." (P3)

Overall, sometimes the Agent was perceived as collaborating with a content creator to help the creator succeed, other times it frustrated creators on how it promoted certain creators over others and prioritized financial gains over creativity. We found many of the complicated dynamics of the YouTuber-Agent relationship emerge in our work: *"I've never officially broken up with YouTube." (P1)*

5.2 Algorithm as Gatekeeper

Another way YouTubers understood the algorithm was through the lens of a gatekeeper. This persona mostly framed the algorithm as standing between content creators and viewers and allocating views to videos. The algorithm as Gatekeeper decides what content viewers see and content creators must learn to play by its rules:

*"If you just walk into it and are naive about it and just want to share your thoughts on this topic because you want to, then I don't think it's going to reach a broad audience because there is [an] algorithm **between you and the viewers**. You need to try to understand the algorithm and play to its strengths, or kinda get really lucky." (P2)*

Gatekeepers have a great deal of power to decide how to allocate resources. With the algorithm as Gatekeeper content creators felt similar power dynamics and a *"need to figure out where I fit in the algorithm"* (P4).

In general, content creators reacted negatively to the perception of the algorithm deciding for people what content they would like to see. For instance, in 2018 YouTube announced that they were planning on experimenting with the subscription feed. This meant viewers would no longer see all of the content by YouTubers that they had subscribed to on their subscription feed. This caused outrage by YouTubers who viewed the Gatekeeper as becoming even more powerful [88]. One YouTuber explained:

"YouTube trusts its own understanding of you based on your watch history more than it trusts you telling it what you like [...] the algorithm gets a little bit more confident about its understanding of you the user, users like you, and who the video that you watched might appeal to in the future." (Y2)

The algorithm as Gatekeeper has the power to decide what type of content goes viral on the platform:

"Makes you wonder what kind of content they make, and if YouTube wants to make that content popular." (P4)

This creates a perception that content creators are dealing with a powerful intermediary:

*"You are not competing with other YouTubers, you are **competing against the system**. That's the key to victory at the end of the day." (Y7)*

Since the algorithm as Gatekeeper oversees billions of videos and earns revenue on a fraction of those, creators are skeptical of its intentions:

"The algorithm with influence over two billion users has such a singular goal there are gonna be unintended side effects especially when money is in the mix." (Y2)

Some content creators did not agree with the Gatekeeper's priorities:

"I would like it to be more diverse, there a lot of people out there, a lot of content that should be seen [and is] more interesting. Bring back making content just for the heck of it as opposed to what's most popular." (P7)

Overall, the YouTuber-Gatekeeper relationship was characterized as working to understand the Gatekeeper's current priorities and trying to fit in. The most salient theme in this relationship was the power imbalance, with YouTubers feeling themselves at the whim of the Gatekeeper: *"All the videos you see on YouTube are at the mercy of YouTube's algorithm."* (P5)

5.3 Algorithm as Drug Dealer

The two personas described above focus on the algorithm's relationship with the content creator (Agent) and the algorithm as standing between videos and views (Gatekeeper). There was a third persona that people frequently mentioned that is not as familiar in the world of creative production: that of a drug dealer. The algorithm as Drug Dealer has one (often described as nefarious) goal: keep viewers on the platform for as long as possible, in a way by making them "addicted" to YouTube:

"The algorithm is really good at keeping us here." (Y2)

The algorithm as Drug Dealer wants to promote creators whose content maximizes watch time:

"YouTube will favor you as a content creator because you are encouraging people to stay on the platform for longer." (Y1)

Additionally, they described the Drug Dealer's actions as myopic, trying relentlessly to serve more videos that the viewer might watch right away even if that meant limiting their options:

"[The algorithm] puts you in a bubble. [It doesn't] show you other things." (P7)

There were also concerns that the algorithm as Drug Dealer pushes content creators into producing high rates of click-bait content:

"People know how to make their videos clickable. Not making content that is impactful, not life-changing, just whatever will grab people's attention." (P7)

Some creators also held YouTube as a company accountable:

"I may not understand how this thing works anymore but I don't think it's a very good excuse because humans code the values and biases of the system. I guess I'm just trying to say that with great power comes great responsibility." (Y2)

Overall, the algorithm as Drug Dealer was one of the ways that content creators made sense of the worst of the algorithm's behavior. They also shared their frustrations about specific YouTubers who they viewed as having "hijacked" the system and profited off of this persona.

It is important to note here that while these three personas — Agent, Gatekeeper, and Drug Dealer — have distinct goals and characters, they also overlap. We sometimes came across content that we could imagine as fitting more than one persona. The value of the personas is in the ways that YouTubers use them to make sense of the algorithm, describe their emotions toward it, and choose their own courses of action in relation to it.

5.4 Not Thinking about the Algorithm

While we have mostly focused on how YouTubers negotiate with the algorithm by virtue of our research question, we also found in our interviews that some YouTubers do not think about the algorithm — including YouTubers who are relatively successful. There are many potential reasons why: some treat making YouTube videos as a hobby and do not concern themselves with growth, and some are just lucky and have found success without needing to think about the algorithm.

Sometimes the algorithm does not affect creators, and it is just an aspect of the platform that they can either serendipitously sync up with or not:

"It does not affect what I post. I post what I want to post. If it rides the wave, great. If not, it is OK. It does not affect how I post so much. I have my personal regime. One a week. I hold myself rigorous for my own sake." (P3)

For one creator, our interview was the most they had ever talked about the algorithm and its effects, and not something they consciously keep in mind while making videos:

"This is the most I've ever thought about the algorithm. It's very eye-opening. It's not something I think about as a creator." (P7)

5.5 How Algorithmic Personas Shape YouTubers' Actions

In this research, we also sought to understand how these personas affected what YouTubers did on the platform and how they factored the personas into their decisions. Sometimes YouTubers oriented themselves toward the personas to achieve their goals, however, sometimes they acted against them. Below we describe how each algorithmic persona impacts YouTubers' behaviors.

5.5.1 Agent. Content creators discussed the importance of trying to understand and build a working relationship with the algorithm as Agent:

*"You wanna **be friends** with the YouTube algorithm which decides to push your video or not." (Y6)*

This quote reflects the perennial dance in "being friendly" versus "being friends" with the Agent [75]. In the case of Y6, the participant recognizes the importance of being friends.

Some YouTubers orient themselves toward the Agent by trying to recognize its tastes so that the algorithm will favor them. A participant reacted to one of our design prototypes that differentiated between a "smart mode" on YouTube as opposed to a "dumb mode" by saying:

"If I could know what gets my videos to be on smart mode, it would help me choose what side I could get onto [...] it would affect me on determining what I would create." (P8)

Similarly, P8's reaction to the "Up and Coming" prototype was:

"Don't know how he [the featured creator] would get there, but it would aspire me to get there because it would be beneficial for my growth [...] It seems like a more wholesome person is recommended, so maybe I would create content like that." (P8)

5.5.2 Gatekeeper. Content creators tried to understand what the Gatekeeper's priorities are and to fit their content into that space to create videos that would be "systematically chosen by YouTube on whether or not they will get views" (Y5). Sometimes this meant following trends:

"I ended up getting a lot of views because I actually piggybacked a very popular trend at the time." (Y5)

In order to pass the algorithm as Gatekeeper, some YouTubers resort to buying their way through. A search of "YouTube advertising" on YouTube shows videos of hobbyist YouTubers sharing their ways of "bribing" the Gatekeeper to get through the door and gain access to subscribers and views by buying YouTube ads.

"How cool would be to be able to generate thousands of real engaged subscribers for your YouTube channel at the click of a button! I'm not talking about buying fake robotic YouTube subscribers either. I'm talking about using YouTube ads to build real authentic relationships." (Y12)

When content creators believe that their channels aren't performing as usual, some blame the algorithm as Gatekeeper for hiding their content from their viewers. In response, they may re-upload their content with a different thumbnail or title or plea for their audience to share and watch their content:

“Things aren’t looking good for this channel right now [...] YouTube is really trying to bury all the videos and views are down astronomically; its hit an all time low [...] Please continue to share all the videos as much as possible to help keep this channel going and the more videos you watch might show YouTube that there’s still a lot of interest in this channel. If you’re confused about the re-upload or anything else that’s going on, please take a look at this video.” (Y11)

5.5.3 *Drug Dealer*. Some YouTubers worked against this persona by producing content they knew would not be favored by the algorithm but would instead be true to their morals and creative integrity.

“My model is slow disperse growth. Trying to go the other way against the click-bait, viral algorithm. My goal is to not to follow that model. It is a dangerous path, it’s luck.” (P3)

However, some YouTubers play into the Drug Dealer persona by creating content that they know will catch the Drug Dealer’s eye and sometimes they had to negotiate conflicting priorities:

“I try not to feed into clickbait [...] My understanding of the algorithm sometimes affects how I post. Sometimes my friend does something crazy, so that will be the thumbnail [...] Subconsciously I’m like don’t do clickbait don’t do clickbait, but I’m trying to find the happy medium. If [you] want to gain traction, you need to do something crazy. I am trying to gain that balance, of sacrificing everything and staying true to myself.” (P1)

5.6 Algorithmic Wishes

In our interviews, and particularly using our design prompts, we engaged with YouTubers around how they would want the algorithm to change. Again, we found YouTubers invoking algorithmic personas as a way to describe their preferred roles for the algorithm: Impartial Judge, Custodian, Diversifier, Educator, Advocator, and Revenue Sharer. Here we describe those personas in more detail.

5.6.1 *Impartial judge*. The YouTubers we interviewed expressed the want for a mechanism to seek explanations and justice from the algorithm should the need arise and to refute algorithmic decisions that affect the visibility of their videos that they believe are unfair.

*“It has done a lot of good for me than bad. I would only propose small increment changes. Have a good **appeal** process, where people can chime in what the conversation battle is all about.” (P3)*

Prior research has found that explanations often led to more awareness of algorithmic decisions and helped users determine whether a system was biased. It also changed their behaviors toward the system and increased their confidence [16, 68]. The possibility of an appeal process for algorithmic systems has received less attention in the literature but would be a rich area for future work.

5.6.2 *Custodian*. Some of our interviewees wanted YouTube to take a more active role in moderating content and keeping the platform a clean and safe space. This was one case in which participants sometimes wanted the role to involve more human interference:

“Human interference would be helpful. Democratic upload [of content] is good, but not truly [...] I put the onus on the company itself. It is an imperfect dilemma. Alex Jones shares a lot of fake news. Twitter decided to ban him for hate speech, and the Apple App Store banned him. He tried to sue them for freedom of speech. These companies have the right of kick people out. It’s like if someone posts a hurtful comment on your wall, you have the right to decide what to do.” (P3)

YouTube does employ thousands of human reviewers to examine reported content uploaded to the site, but creators and others do not think that it is enough [87] and there have been many reports of the dire conditions under which these “custodians of the internet” work [34, 70]. There have also been calls for YouTube to change their algorithms, update their community guidelines, and for greater human involvement in the recommendation process.

5.6.3 Diversifier. The YouTubers we talked to were unhappy with the “rabbit hole effect” of the algorithm. They wished that the algorithm would not assume viewers’ interests based on a one-time search and constantly show them the same kind of content.

“The worst thing about YouTube is that you search for one thing, and you’ll only see more of that same thing. It makes it hard to explore new content.” (P3)

This wish echoes research on viewers of YouTube home improvement videos where Wolf argues that these online platforms have an effect of information narrowing and not widening [90]. By invoking the Diversifier persona, our interviewees believed that the removal of the filter-bubble recommendation could lead to more diverse viewers for their content and a higher number of unique viewers. Based on this early insight, one of our design prototypes was intended to invoke a more diverse recommendation algorithm (Figure 1 Prototype 2):

“[The diversify prototype] would be an awesome change... It would allow for more viewers and unique viewers to visit my channel.” (P8)

Diversifier is a persona that does not have an obvious parallel in the offline world.

5.6.4 Educator. YouTubers’ perceptions of the algorithm was that it tends to “return to the mean,” underestimating the intelligence of the audience. Some of our participants believed that the algorithm’s recommendations are driven by people and people enjoy watching what they called “mindless” and “dumb” content. YouTubers discussed the business model behind the company and argued that since profit is mostly determined by views, clicks and watch time, clickbait and senseless content go viral. YouTubers called for characteristics of an Educator persona to bring out more meaningful and productive content:

“I’m trying to stay away from creating content that fits the current trend such as boyfriend tags as much as possible, some are funny, but some are horribly dumb.” (P1)

5.6.5 Advocator. YouTubers also wished that the platform would promote smaller channels and original content creators, arguing that doing so would be more fair:

“What I want the algorithm to do, is to do this fairly. It’s quite obvious YouTube prefers big TV and Hollywood names over its original content creators minus those that are already big and even then sometimes they don’t. It’s been said on this forum YTTalk a lot that the company is trying to take the You out of YouTube. They want to compete with TV and thus bank on big names and big companies, forgetting the roots that they came from: The Original Creators.” (Y10)

5.6.6 Revenue Sharer. Some YouTubers in our study believed that it would be more fair if the revenue share percentage would be higher for content creators who make YouTube successful and valuable:

“A lot of the audience came to YouTube because of the famous YouTubers. YouTube should increase the percentage of revenue share for those YouTubers [... It is a] great tool to share content but needs to pay more respect to people who made YouTube famous and drew the huge audience over.” (P5)

This last wish was closer to a business model wish than a strictly algorithmic wish. However, as mentioned before, participants sometimes referred to the algorithm, the platform, and the company interchangeably. This finding echoes prior work that folk theories account for not only the cyber-social system, but also sometimes the company behind the system [30].

5.7 Personal Experience and Collective Sense Making: How YouTubers Craft Personas

How do content creators come up with these understandings? We found that they rely on their personal experiences of what they believe makes their content gain traction, as well as through discussing their understandings with fellow YouTubers.

Creators take note of when their video gets attention from viewers and make post-hoc hypotheses of how the algorithm operates. For instance, in analyzing the algorithm as Drug Dealer, one content creator described how their content gets pushed to viewers to elicit a reaction:

"I posted a video about Asian fetishes and I still get comments three years later. People hate it. Maybe that's what YouTube is pushing. Videos where people get offended." (P1)

Discussing the algorithm with other YouTubers is another way creators make sense of the algorithm:

"I hear a lot via online platforms. I am so invested in the community so I hear a lot. I have friends that make content online. Girls night out, we talk about algorithm. [The algorithm] becomes so integrated into your life." (P1)

VidCon is another one of the spaces that YouTubers have created to engage in mutual aid, collective sense making. In recent years, talks about the algorithm has become a staple of the event with a full session devoted to it (Figure 2). At the 2018 Vidcon, a YouTuber gave a presentation describing techniques and strategies to succeed on YouTube, as well as technical backings from an academic paper published by Google researchers on deep learning and recommendation systems (Figure 3). This presentation, and the existence of the convention itself, illustrates the fact that YouTubers care deeply about their work and the ways that the algorithm affects it:

"I went [to VidCon] to meet new people first of all. I went there to try to understand YouTube better [...] feel like I'm really really terrible at like tagging videos and knowing about like the algorithm, oh my gosh." (Y9)

YouTubers are at the forefront of people having to engage with complex, opaque algorithms as part of their work. Our research shows that they are increasingly engaged in strategies for making sense of the algorithm through personal experience and collective sense-making. These findings echo prior work on how users form folk theories and imaginaries of algorithmic systems suggesting that the mechanisms are the same [20, 22, 45]. In this work, we focus on how content creators personify the algorithm in an effort to understand the social roles that it plays in the YouTube ecosystem.

6 DISCUSSION: WORKING WITH (AND AGAINST) ALGORITHMIC PERSONAS

In this section, we discuss the implications of algorithmic personas.

6.1 The Ethics and Politics of Algorithmic Personas

Framing our understanding of algorithms as personas allows us to make use of the offline context of those personas to better understand an algorithm's role in its current socio-technical context. Here, we analyze each of the three personas that we found in turn.

6.1.1 Algorithm as Agent. Most similar to the algorithm as Agent are talent agents in the entertainment industry. Talent agents have a stake in the financial success of the talents they represent

Fig. 2. Interest in and discussion about the YouTube algorithm has increased in recent years. This graph shows the number of times the word “algorithm” was mentioned in VidCon programs that were available online.

Fig. 3. A presentation at VidCon 2018 titled “How Does the YouTube Algorithm Work in 2018”. The speaker is a YouTube content creator who describes the algorithm to an audience of other YouTubers using available statistics (e.g. Average View Duration), personal experience, and results from A/B tests on his own channel. In this screenshot he is discussing an academic paper published by researchers at Google [17] that describes the “dramatic performance improvements” to the YouTube algorithm through deep learning. We saw this paper referenced repeatedly as one of few windows provided into the technical workings of the algorithm [28, 32].

because agents take a percentage from the salaries of their talents. As the movie industry grew and movies studios consolidated to a few powerful ones, it was difficult for talents to navigate the industry. Therefore, in the 1920s agents who advocated for talents sprung and spread, becoming a major stakeholder in the power chain of the entertainment industry [42, 59]. Hollywood agents – though dominated by a few big agencies – still provide talents with a few options to choose from. However, the YouTube algorithm as Agent is the only option that YouTubers have, which means that YouTubers are completely beholden to the algorithm. More recently, Multi-Channel Networks (MCN) have formed that collectively represent a number of YouTube channels as clients [19]. However, these networks are mostly reserved for high profile YouTubers.

These developments are reminiscent of how the role of talent agents changed over time in Hollywood. Around the 1980s, the talent agency business started changing from a industry of many small, independent agencies to a few major conglomerates, financed by public shareholder funding. This led to changes in taste for creative projects and creative talents. Lucrative deals lay with the few star celebrities, and clients who did not generate big profit margins were dismissed and ignored [75]. The talent agents felt that the creative aspects of their professional identity were undermined. Similarly, some content creators see YouTube as having transformed from the

democratizing platform they once saw it as to a player in the mainstream media industry [57]: prioritizing shareholders' interests over users' and contributors' interests. Thus some YouTubers perceive the algorithm as favoring content and creators that can generate large followings instead of focusing on their creative value.

YouTube simultaneously plays two distinct roles in the real-world analogue of the entertainment industry: the studio (buyer) and the agent (seller). YouTube as a talent buyer offers YouTubers employment opportunities by providing them with the platform to be viewed by billions of people, with the chance of being featured in YouTube originals (mostly reserved for celebrity YouTubers), and with the resulting advertising revenue. The YouTube algorithm, as perceived by many of our participants, has also taken on the role of a talent agent, advocating for YouTubers' creative talent and procuring employment for YouTubers. A talent agent, in the real-world analogue, is on the selling-side of the talent business. However, in the case of YouTube, the studio and the agent are in effect within the same organization. This creates a conflict in the talent agent's ability and responsibility to promote the talent. The talent-agent relationship in the offline world has been described as "coupled careers" and an interdependent relationship[75]. Yet, in the case of YouTube, the content creators are largely beholden to the whims of the algorithm. Content creators' expectations of the YouTube algorithm embodied in the agent persona is that the algorithm would be on their side - the selling-side of the talent business. The YouTube algorithm, also playing the role of a studio producer in effect, violates the expectations of the content creators.

Additionally, in the offline-world talent agents typically take about 10-20 percent of client's salary [75]. However, on YouTube, the platform takes 45 percent of the advertising revenue generated by the content creators' videos [73]. In comparing the algorithmic persona with its real-world analogue, we can better understand the wish for a Revenue Sharer persona.

6.1.2 Algorithm as Gatekeeper. Gatekeepers take many forms in the real world: job interviewers, college admissions officers, or a bouncer at a bar. Gatekeepers must make judgments and decisions about allocation of resources or opportunities. A gatekeeper is fraught with their own personal biases. How much power do gatekeepers have? What are their decision making criteria? How can those criteria be contested? These are some of the open questions that also apply to the algorithm as Gatekeeper.

Prior research has found that feedback loops make users effectively gatekeepers for each other [69]. Our empirical study confirms this argument by finding that content creators view the YouTube algorithm, which is a product of the input of content creators, content consumers, and YouTube software engineers, as a gatekeeper. Therefore, the gatekeeper persona that our participants elicited is not just a product of the algorithm as defined by the programmers at YouTube, but also of the users, including content creators and content consumers. Similarly, researchers have argued that critiquing the workings of algorithms is not enough because people also do things to algorithms via the feedback loop [13]. One possible way to break out of a negative feedback loop is to organize among content creators. For instance, instead of working against the algorithm individually like some of our interviewees did, work with other content creators to generate a critical mass that counteract the algorithm by behaving (posting video content/liking/subscribing) in ways that may deviate from the algorithm's predictions and break the feedback loop. A collective movement on the part of content creators can potentially tilt the algorithm to favor content not conventionally favored and counter-balance feedback-loop-induced algorithmic curation effects.

6.1.3 Algorithm as Drug Dealer. YouTube, the company, mainly earns revenue through targeted ads on videos. Until 2012, view count was considered the primary factor of a successful video. However, YouTube learned that a high view count did not necessarily translate to viewer retention. For example, a group who became known as the Reply Girls made videos flagged as replies to popular

videos, but with sexually suggestive thumbnails [27]. People clicked on the Reply Girls' videos and consequently the group earned tens of thousands of dollars in ad revenue [27]. In October of 2012, partly in response to the Reply Girls, YouTube released a new algorithm that favored videos with higher watch times. YouTube describes watch time as "the amount of time in aggregate that your viewers are watching your videos." [72]. Watch time is not just a percentage of how much of a video is watched, but how much a video contributes to a user's overall session on the platform. Research conducted on measuring user engagement describes that self-reports and web analytics are the two ways to track user engagement [47]. Some of our participants viewed YouTube's choice of measuring user engagement through watch time as contributing to the algorithm favoring addictive content – content that viewers cannot stop watching, and want more of. It has been successful at doing so and is the second most visited website in the world with the highest average visit duration of 22 minutes [2].

At this scale, there are public safety risks that we need to consider. In the disturbing live streamed video that has since been removed from internet, the Christchurch mosque shooter invited viewers to subscribe to the most subscribed individual on YouTube. His attack was engineered for virality, and meant to feed the extremist content on YouTube and the internet [6]. YouTube has been publicly criticized for recommending toxic content for the sake of engagement [9]. YouTube's recommendation algorithm has also put minors at risk, recommending nightmarish knock-off versions of popular kid-friendly content [41], and enabling child predators to communicate with each other via the comments section [71].

6.2 Conversations & Contracts: Design and Policy Implications

In user-centered design, personas are fictional characters meant to represent an application's target audience. Previous research shows that personas act as a means of communication [67]. Through their fictional human motivations, personas have the unique power to allow designers to engage with and understand the target audience of the design. We propose algorithmic personas as a way to engage with them, not as representations of the target audience, but as aspects of the algorithms that have goals and motivations. Framing the algorithm's behaviors as personas, we can concretely name and discuss the real world impacts each has for instance from an ethical, political, or fairness oriented viewpoint. Analyzing the closest human equivalents of algorithmic personas is an effective conceptual tool in thinking about the design and policy implications of algorithms as they behave in the real world.

For example, many states require talent agents to procure professional licenses and regulated their business practices after decades of labor struggles. California's Talent Agency Act, for instance, "prohibits agents from giving their clients false or misleading information concerning employment engagements; sending them to unsafe places." [93] Lawsuits were brought against talent agents in manipulating talents into accepting jobs for the sole benefits of the agent. In our research, we have learned that YouTubers, under the manipulation of the algorithm, modify their behaviors to fit themselves through the window of opportunity that the algorithm provides, sometimes compromising their own creative integrity and even personal safety (in the case of harassment). Here we need to respect the multi-faceted motivations of YouTube content creators including monetary, personal passion, and altruistic causes.

Legal measures in the offline world that are intended to protect the talents' interests are lacking in the world where the algorithm acts as an Agent. What would it look like for an algorithm as Agent to procure a professional license in its role of locating employment opportunities for talents and to be regulated to protect the rights of talents? Another way talents interact with an agent is through a contract that specifies each person's responsibilities and liabilities. Could we introduce contracts between YouTubers and the algorithm? As we wrote this paper six YouTube stars sued

YouTube for what they viewed as an unfair algorithm that discriminates against LGBT YouTubers [3].

YouTube content creators' anthropomorphic language in describing the algorithm demonstrates the various human-like roles that the algorithm plays, but the algorithm still isn't human. It can't understand the nuances a human gatekeeper could. This indicates a socio-technical gap, which is caused by automating tasks traditionally carried out by humans without careful consideration of the differences between humans and computers. Humans make flexible and subtly different decisions based on context, while computers build rigid and simplified models by aggregating similar but distinct situations [5]. Humans can act upon ambiguity implicitly, while computers often solve problems in a black or white manner and require explicitness [4]. We reference Ju and Leifer's implicit design framework, which aims to guide designers to consider the broad spectrum of interactions (from foreground to background, and from reactive to proactive) and to encourage modelling human-to-human interaction when designing for human-computer interactions [40]. One human-to-human interaction is asking questions to learn people's intentions, asking for permission to do something that may affect them, and challenging them if we disagree. What if, for example, a creator could ask the algorithm why their video got demonetized? Explainability is a value that researchers have called for in Machine Learning systems, but what exactly the shape of those explanations might be is an open question that algorithmic personas can provide insight to.

7 FUTURE WORK

In this paper, we have introduced and studied the concept of algorithmic personas in the context of content creators' understandings of the YouTube algorithm. One area of future work will be to study views of other actors (e.g. video viewers, programmers, advertisers). Another direction will be the study of how algorithmic personas can facilitate understanding of algorithms on other platforms.

7.1 Why Content Creators Work With or Against Algorithmic Personas

We will further study the deciding factors of content creators' choices in working with or working against the algorithm. Prior research offers some reasons for why Facebook users work against the algorithm, such as to protect their privacy or to control the suggestions that Facebook gives them [13]. Our research shows that for YouTube content creators, privacy and control of the content feeds are less important reasons for their counter-actions. One potential dynamic that we found is that content creators strive to work with the algorithm at the beginning of their YouTube careers by adjusting their behaviors in ways that they think would make them successful at gaining views, subscribers or watch time. When they encounter consistent breakdowns of expectations, some creators give up on trying to "make it" and instead focus on creating the videos that they enjoy creating. Other creators disapprove of the values that are promoted by the algorithm and choose to rebel against the algorithm by posting content that they believe is right but may not necessarily be favored by the algorithm. However, we did not explicitly probe why content creators choose to work with or against the algorithm in our interview and survey studies. This topic deserves further exploration in future studies.

7.2 Engaging Users in Discussions about Fairness

We embarked on this research not as objective outsiders but from the angle of redesigning the YouTube algorithm for fairness. This angle may have biased our questions and understandings of the situation. In future work, we plan to leverage participatory design to engage our participants further. We will create more tools conceptually (e.g. personas) and physically (e.g. design provocations) to engage various stakeholders in algorithmic design. There have been calls for shared ownership

and democratic governance² of these large scale platforms [48, 77, 78]. This is not possible without deep engagement and co-design with the people who would be participating in that governance.

We also plan to explore the implications for fairness by design. Definitions of fairness vary depending on social, task, and value contexts [50]. From the social context, YouTube content creators exemplify a segment of the population who are heavily affected by algorithmic decisions. From the value context, researchers should evaluate fairness of an algorithm not only based on its mathematical accuracy in distributing resources, but by situating fairness among stakeholders' preferences and personal values [50]. Hobbyist YouTube content creators' motivations go beyond just monetary incentives. Algorithm designers should consider the rich set of values of the group they impact when designing for fairness [51, 52].

8 CONCLUSION

We engaged with hobbyist YouTube content creators, individuals who are significantly impacted by algorithmic decisions, to learn how they make sense of the algorithm. We took an ethnographically inspired approach and used design as provocation in interviews; we also sought to find people where they are by analyzing native formats of information sharing. Our study shows that hobbyist YouTube content creators crafted algorithmic personas to facilitate and augment their discussions in the process of collective sense-making of the algorithm. They assign anthropomorphic features and cultural values to the algorithm. We categorized our themes into three major personas that repeatedly came up: Agent, Gatekeeper, and Drug Dealer. An Agent promotes the content creator and procures employment for them. A Gatekeeper stands between the creator and viewers and decides which videos can get views. A Drug Dealer aims to keep viewers hooked on the platform for as long as possible. These three personas are multi-dimensional and there are overlaps among them. They act as conceptual devices that help content creators make sense of the algorithm's behavior. Through the lens of the algorithmic personas crafted by YouTube content creators, we can enrich our understanding of algorithms and their impact in the real world. We explore the design and policy implications derived from each of the three algorithmic personas. Algorithmic personas, invoking human characteristics in code-base algorithmic artifacts, enable designers and policy makers to design for human-to-computer systems with human-to-human relations as guides.

9 ACKNOWLEDGMENTS

We would like to thank the YouTube content creators who took the time to speak with us and the reviewers for their detailed reviews.

REFERENCES

- [1] [n. d.]. YouTube Millionaires. Website. Retrieved April 2, 2019 from <https://www.tubefilter.com/tag/YouTube-Millionaires/>
- [2] 2019. Top Websites Ranking. Website. Retrieved April 4, 2019 from <https://www.similarweb.com/top-websites>
- [3] 2019. 'We can't reach the women who need us': the LGBT YouTubers suing the tech giant for discrimination. Website. Retrieved August 14, 2019 from <https://www.theguardian.com/technology/2019/aug/14/youtube-bria-kam-chrissy-chambers-lesbian-vloggers-lgbtq-discrimination>
- [4] Mark S. Ackerman. 2000. The Intellectual Challenge of CSCW: The Gap Between Social Requirements and Technical Feasibility. *Hum.-Comput. Interact.* 15, 2 (Sept. 2000), 179–203. https://doi.org/10.1207/S15327051HCI1523_5
- [5] Ali Alkhatib and Michael Bernstein. 2019. Street-Level Algorithms: A Theory at the Gaps Between Policy and Decisions. (2019).
- [6] Michael Barbaro. 2019. The Mosque Attacks in New Zealand. <https://www.nytimes.com/2019/03/18/podcasts/the-daily/new-zealand-mosque-shooting.html>

²The Platform Cooperativism conference was founded in 2017.

- [7] Kristin Bauersfeld and Shannon Halgren. 1996. "You've got three days!" Case studies in field techniques for the time-challenged. In *Field methods casebook for software design*. John Wiley & Sons, Inc., 177–195.
- [8] James Beebe. 1995. Basic concepts and techniques of rapid appraisal. *Human organization* (1995), 42–51.
- [9] Mark Bergen. 2019. YouTube Executives Ignored Warnings, Letting Toxic Videos Run Rampant. Website. Retrieved April 4, 2019 from <https://www.bloomberg.com/news/features/2019-04-02/youtube-executives-ignored-warnings-letting-toxic-videos-run-rampant>
- [10] Sophie Bishop. 2018. Anxiety, panic and self-optimization: Inequalities and the YouTube algorithm. <https://doi.org/10.1177/1354856517736978> Last accessed 7 March 2019.
- [11] Jeanette Blomberg, Jean Giacomini, Andrea Mosher, and Pat Swenton-Wall. 2017. Ethnographic field methods and their relation to design. In *Participatory Design*. CRC Press, 123–155.
- [12] Tom J. Broxton and Olga Khroustaleva. 2012. Supporting an Ecosystem: From the Biting Baby to the Old Spice Man. In *Proceedings of the 10th European Conference on Interactive TV and Video (EuroITV '12)*. ACM, New York, NY, USA, 7–8. <https://doi.org/10.1145/2325616.2325619>
- [13] Taina Bucher. 2017. The algorithmic imaginary: exploring the ordinary affects of Facebook algorithms. *Information, Communication & Society* 20, 1 (2017), 30–44. <https://doi.org/10.1080/1369118X.2016.1154086> arXiv:<https://doi.org/10.1080/1369118X.2016.1154086>
- [14] Jenna Burrell. 2016. How the machine 'thinks': Understanding opacity in machine learning algorithms. *Big Data & Society* 3, 1 (2016), 2053951715622512.
- [15] John Cheney-Lippold. 2011. A new algorithmic identity: Soft biopolitics and the modulation of control. *Theory, Culture & Society* 28, 6 (2011), 164–181.
- [16] Kelley Cotter, Janghee Cho, and Emilee Rader. 2017. Explaining the news feed algorithm: An analysis of the News Feed FYI blog. In *Proceedings of the 2017 CHI conference extended abstracts on human factors in computing systems*. ACM, 1553–1560.
- [17] Paul Covington, Jay Adams, and Emre Sargin. 2016. Deep neural networks for youtube recommendations. In *Proceedings of the 10th ACM conference on recommender systems*. ACM, 191–198.
- [18] Shelley L Craig and Lauren McNroy. 2014. You can form a part of yourself online: The influence of new media on identity development and coming out for LGBTQ youth. *Journal of Gay & Lesbian Mental Health* 18, 1 (2014), 95–109.
- [19] Stuart Cunningham, David Craig, and Jon Silver. 2016. YouTube, multichannel networks and the accelerated evolution of the new screen ecology. *Convergence* 22, 4 (2016), 376–391.
- [20] Michael A DeVito, Jeremy Birnholtz, Jeffery T Hancock, Megan French, and Sunny Liu. 2018. How People Form Folk Theories of Social Media Feeds and What It Means for How We Study Self-Presentation. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, 120.
- [21] Michael A DeVito, Darren Gergle, and Jeremy Birnholtz. 2017. Algorithms ruin everything:# RIPTwitter, folk theories, and resistance to algorithmic change in social media. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*. ACM, 3163–3174.
- [22] Michael A DeVito, Jeffrey T Hancock, Megan French, Jeremy Birnholtz, Judd Antin, Karrie Karahalios, Stephanie Tong, and Irina Shklovski. 2018. The Algorithm and the User: How Can HCI Use Lay Understandings of Algorithmic Systems?. In *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, panel04.
- [23] Judith Donath. 2007. Signals in Social Supernets. *Journal of Computer-Mediated Communication* 13, 1 (10 2007), 231–251. <https://doi.org/10.1111/j.1083-6101.2007.00394.x> arXiv:<http://oup.prod.sis.lan/jcmc/article-pdf/13/1/231/22317022/jjcmcom0231.pdf>
- [24] Paul Dourish. 2016. Algorithms and their others: Algorithmic culture in context. *Big Data & Society* 3, 2 (2016), 2053951716665128.
- [25] Motahhare Eslami, Karrie Karahalios, Christian Sandvig, Kristen Vaccaro, Aimee Rickman, Kevin Hamilton, and Alex Kirlik. 2016. First I "Like" It, then I Hide It: Folk Theories of Social Feeds. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI '16)*. ACM, New York, NY, USA, 2371–2382. <https://doi.org/10.1145/2858036.2858494>
- [26] Motahhare Eslami, Aimee Rickman, Kristen Vaccaro, Amirhossein Aleyasen, Andy Vuong, Karrie Karahalios, Kevin Hamilton, and Christian Sandvig. 2015. I always assumed that I wasn't really that close to [her]: Reasoning about Invisible Algorithms in News Feeds. In *Proceedings of the 33rd annual ACM conference on human factors in computing systems*. ACM, 153–162.
- [27] M. Eslami et al. 2016. First I "Like" it, then I hide it: Folk Theories of Social Feeds. http://social.cs.uiuc.edu/papers/pdfs/Eslami_FolkTheories_CHI16.pdf Last accessed 7 December 2018.
- [28] Derral Eves. 2018. How Does the YouTube Algorithm Work in 2018 (Full Presentation). <https://www.youtube.com/watch?v=U-bEGKR-gls>
- [29] Chris Foxx. 2018. YouTube stars' fury over algorithm tests. Website. Retrieved April 2, 2019 from <https://www.bbc.com/news/technology-44279189>

- [30] Megan French and Jeff Hancock. 2017. What's the folk theory? Reasoning about cyber-social systems. (2017).
- [31] Jacob Gardner and Kevin Lehnert. 2016. What's new about new media? How multi-channel networks work with content creators. *Business Horizons* 59, 3 (2016), 293 – 302. <https://doi.org/10.1016/j.bushor.2016.01.009>
- [32] Matt Gielen. 2017. Reverse Engineering The YouTube Algorithm: Part II. Website. Retrieved April 4, 2019 from <https://www.tubefilter.com/2017/02/16/youtube-algorithm-reverse-engineering-part-ii/>
- [33] Tarleton Gillespie. 2014. The relevance of algorithms. *Media technologies: Essays on communication, materiality, and society* 167 (2014), 167.
- [34] Tarleton Gillespie. 2018. *Custodians of the Internet: Platforms, content moderation, and the hidden decisions that shape social media*. Yale University Press.
- [35] Lev Grossman. 2006. You–Yes, You–Are TIME's Person of the Year, Time Magazine. Retrieved August, 2019 (2006).
- [36] Hugh Gusterson. 1997. Studying up revisited. *PoLAR: Political and Legal Anthropology Review* 20, 1 (1997), 114–119.
- [37] Mattias Holmbom. 2015. The YouTuber: A Qualitative Study of Popular Content Creators. Last accessed 7 March 2019.
- [38] Lilly C Irani and M Silberman. 2013. Turkopticon: Interrupting worker invisibility in Amazon mechanical turk. In *Proceedings of the SIGCHI conference on human factors in computing systems*. ACM, 611–620.
- [39] Shagun Jhaver, Yoni Karpfen, and Judd Antin. 2018. Algorithmic Anxiety and Coping Strategies of Airbnb Hosts. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI '18)*. ACM, New York, NY, USA, Article 421, 12 pages. <https://doi.org/10.1145/3173574.3173995>
- [40] W. Ju and L. Leifer. 2008. The Design of Implicit Interactions: Making Interactive Systems Less Obnoxious. *Design Issues* 24, 3 (July 2008), 72–84. <https://doi.org/10.1162/desi.2008.24.3.72>
- [41] Laura June. 2017. YouTube has a fake Peppa Pig Problem. Website. Retrieved April 4, 2019 from <https://theoutline.com/post/1239/youtube-has-a-fake-peppa-pig-problem?zd=1&zi=v5trdre>
- [42] Tom Kemper. 2010. *Hidden talent: the emergence of Hollywood agents*. University of California Press Berkeley.
- [43] Susie Khamis, Lawrence Ang, and Raymond Welling. 2017. Self-branding, 'micro-celebrity' and the rise of Social Media Influencers. *Celebrity Studies* 8, 2 (2017), 191–208.
- [44] Rob Kitchin and Martin Dodge. 2011. *Code/space: Software and everyday life*. MIT Press.
- [45] Erin Klawitter and Eszter Hargittai. 2018. "It's Like Learning a Whole Other Language": The Role of Algorithmic Skills in the Curation of Creative Goods. *International Journal of Communication* 12, 0 (2018).
- [46] Anastasia Kuzminykh and Edward Lank. 2016. People Searched by People: Context-Based Selectiveness in Online Search. In *Proceedings of the 2016 ACM Conference on Designing Interactive Systems (DIS '16)*. ACM, New York, NY, USA, 749–760. <https://doi.org/10.1145/2901790.2901853>
- [47] O'Brien H. Lalmas, M. and E. Yom-Tov. 2014. Measuring User Engagement. <https://www.morganclaypool.com/doi/abs/10.2200/S00605ED1V01Y201410ICR038> Last accessed 25 June 2019.
- [48] Airi Lampinen, Moira McGregor, Rob Comber, and Barry Brown. 2018. Member-Owned Alternatives: Exploring Participatory Forms of Organising with Cooperatives. *Proceedings of the ACM on Human-Computer Interaction* 2, CSCW (2018), 100.
- [49] Patricia G. Lange. 2007. Publicly Private and Privately Public: Social Networking on YouTube. *Journal of Computer-Mediated Communication* 13, 1 (10 2007), 361–380. <https://doi.org/10.1111/j.1083-6101.2007.00400.x> arXiv:<http://oup.prod.sis.lan/jcmc/article-pdf/13/1/361/22317316/jjcmcom0361.pdf>
- [50] Min Kyung Lee. 2017. Conceptualizing fairness and trust in algorithmic decision-making. (2017).
- [51] Min Kyung Lee and Su Baykal. 2017. Algorithmic Mediation in Group Decisions: Fairness Perceptions of Algorithmically Mediated vs. Discussion-Based Social Division. In *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing (CSCW '17)*. ACM, New York, NY, USA, 1035–1048. <https://doi.org/10.1145/2998181.2998230>
- [52] Min Kyung Lee, Ji Tae Kim, and Leah Lizarondo. 2017. A Human-Centered Approach to Algorithmic Services: Considerations for Fair and Motivating Smart Community Service Management That Allocates Donations to Non-Profit Organizations. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17)*. ACM, New York, NY, USA, 3365–3376. <https://doi.org/10.1145/3025453.3025884>
- [53] Min Kyung Lee, Daniel Kusbit, Evan Metsky, and Laura Dabbish. 2015. Working with Machines: The Impact of Algorithmic and Data-Driven Management on Human Workers. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (CHI '15)*. ACM, New York, NY, USA, 1603–1612. <https://doi.org/10.1145/2702123.2702548>
- [54] Lawrence Lessig. 2008. *Remix: Making art and commerce thrive in the hybrid economy*. Penguin.
- [55] Ben Light, Marie Griffiths, and SiÁcn Lincoln. 2012. 'Connect and create': Young people, YouTube and Graffiti communities. *Continuum* 26, 3 (2012), 343–355. <https://doi.org/10.1080/10304312.2012.665833> arXiv:<https://doi.org/10.1080/10304312.2012.665833>
- [56] Jessa Lingel and Mor Naaman. 2012. You should have been there, man: Live music, DIY content and on-line communities. *New Media & Society* 14, 2 (2012), 332–349. <https://doi.org/10.1177/1461444811417284>

- arXiv:<https://doi.org/10.1177/1461444811417284>
- [57] Ramon Lobato. 2016. The cultural logic of digital intermediaries: YouTube multichannel networks. *Convergence* 22, 4 (2016), 348–360. <https://doi.org/10.1177/1354856516641628> arXiv:<https://doi.org/10.1177/1354856516641628>
 - [58] Costanza Maio. 2015. *Watching Me, Watching You: Discovering and Interacting with Muslimah YouTubers*. Ph.D. Dissertation. New York University.
 - [59] SECRET AGENT MAN. 2013. The History of Hollywood Agents. Website. Retrieved April 3, 2019 from <https://www.backstage.com/magazine/article/history-hollywood-agents-12929/>
 - [60] Alice Marwick. 2015. You may know me from YouTube. *A companion to celebrity* 333 (2015).
 - [61] Sarah McRoberts, Elizabeth Bonsignore, Tamara Peyton, and Svetlana Yarosh. 2016. Do It for the Viewers!: Audience Engagement Behaviors of Young YouTubers. In *Proceedings of the The 15th International Conference on Interaction Design and Children (IDC '16)*. ACM, New York, NY, USA, 334–343. <https://doi.org/10.1145/2930674.2930676>
 - [62] David R Millen. 2000. Rapid ethnography: time deepening strategies for HCI field research. In *Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods, and techniques*. ACM, 280–286.
 - [63] David R Millen and Susan M Dray. 2000. Information sharing in an online community of journalists. In *Aslib Proceedings*, Vol. 52. MCB UP Ltd, 166–173.
 - [64] Margaret Mitchell, Simone Wu, Andrew Zaldivar, Parker Barnes, Lucy Vasserman, Ben Hutchinson, Elena Spitzer, Inioluwa Deborah Raji, and Timnit Gebru. 2019. Model cards for model reporting. In *Proceedings of the Conference on Fairness, Accountability, and Transparency*. ACM, 220–229.
 - [65] Judith S Olson and Wendy A Kellogg. 2014. *Ways of Knowing in HCI*. Vol. 2. Springer.
 - [66] James Pierce and Carl DiSalvo. 2018. Addressing Network Anxieties with Alternative Design Metaphors. <https://dl.acm.org/citation.cfm?id=3174123> Last accessed 7 December 2018.
 - [67] John Pruitt and Jonathan Grudin. 2003. Personas: Practice and Theory. <https://dl.acm.org/citation.cfm?id=997089> Last accessed 26 June 2019.
 - [68] Emilee Rader, Kelley Cotter, and Janghee Cho. 2018. Explanations As Mechanisms for Supporting Algorithmic Transparency. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI '18)*. ACM, New York, NY, USA, Article 103, 13 pages. <https://doi.org/10.1145/3173574.3173677>
 - [69] Emilee Rader and Rebecca Gray. 2015. Understanding user beliefs about algorithmic curation in the Facebook news feed. In *Proceedings of the 33rd annual ACM conference on human factors in computing systems*. ACM, 173–182.
 - [70] Sarah T Roberts. 2019. *Behind the Screen: Content Moderation in the Shadows of Social Media*. Yale University Press.
 - [71] Adi Robertson. 2019. YouTube’s child predator comment controversy: all the latest updates. Website. Retrieved April 4, 2019 from <https://www.theverge.com/tech/2019/2/22/18236847/youtube-kids-inappropriate-comments-demonetization-child-exploitation-ad-policy-updates>
 - [72] Mark R. Robertson. 2014. Watch Time: A Guide to YouTube’s TOP Search Ranking Factor. <https://tubularinsights.com/youtube-watch-time/> Last accessed 25 June 2019.
 - [73] Eric Rosenberg. 2018. How YouTube Ad Revenue Works. Website. Retrieved April 4, 2019 from <https://www.investopedia.com/articles/personal-finance/032615/how-youtube-ad-revenue-works.asp>
 - [74] Dana Rotman, Jennifer Golbeck, and Jennifer Preece. 2009. The Community is Where the Rapport is – on Sense and Structure in the Youtube Community. In *Proceedings of the Fourth International Conference on Communities and Technologies (C&T '09)*. ACM, New York, NY, USA, 41–50. <https://doi.org/10.1145/1556460.1556467>
 - [75] Violaine Roussel. 2016. *Talent Agenting in the Age of Conglomerates*. University of California Press, 74–87. <http://www.jstor.org/stable/10.1525/j.ctt1ffjn40.10>
 - [76] Matthew J Salganik and Karen EC Levy. 2015. Wiki surveys: Open and quantifiable social data collection. *PloS one* 10, 5 (2015), e0123483.
 - [77] Trebor Scholz. 2016. Platform cooperativism. *Challenging the corporate sharing economy*. New York, NY: Rosa Luxemburg Foundation (2016).
 - [78] Trebor Scholz and Nathan Schneider. 2017. *Ours to hack and to own: The rise of platform cooperativism, a new vision for the future of work and a fairer internet*. OR books.
 - [79] Douglas Schuler and Aki Namioka. 1993. *Participatory design: Principles and practices*. CRC Press.
 - [80] Nick Seaver. 2014. Knowing algorithms.
 - [81] Nick Seaver. 2017. Algorithms as culture: Some tactics for the ethnography of algorithmic systems. *Big Data & Society* 4, 2 (2017), 2053951717738104.
 - [82] Andrew D Selbst and Julia Powles. 2017. Meaningful information and the right to explanation. *International Data Privacy Law* 7, 4 (2017), 233–242.
 - [83] Susan Leigh Star. 1999. The ethnography of infrastructure. *American behavioral scientist* 43, 3 (1999), 377–391.
 - [84] Ted Striphas. 2010. How to have culture in an algorithmic age. *The Late Age of Print* 14 (2010).
 - [85] Berk Ustun, Alexander Spangher, and Yang Liu. 2019. Actionable recourse in linear classification. In *Proceedings of the Conference on Fairness, Accountability, and Transparency*. ACM, 10–19.

- [86] José Van Dijck. 2009. Users like you? Theorizing agency in user-generated content. *Media, culture & society* 31, 1 (2009), 41–58.
- [87] Daisuke Wakabayashi. 2019. The Most Measured Person in Tech Is Running the Most Chaotic Place on the Internet. <https://nyti.ms/2VQGc3M>
- [88] Geoff Weiss. 2018. YouTube Confirms Test Of Subscriptions Feed Driven By Algorithm And Not Chronology, Angering Creators. Website. Retrieved April 4, 2019 from <https://www.tubefilter.com/2018/05/24/youtube-subscription-feed-algorithm-test/>
- [89] Wilma Westenberg. 2016. The influence of YouTubers on teenagers. https://essay.utwente.nl/71094/1/Westenberg_MA_BMS.pdf Last accessed 3 April 2019.
- [90] Christine Wolf. 2016. DIY videos on YouTube: Identity and possibility in the age of algorithms. *First Monday* 21, 6 (2016).
- [91] Deirdre K Wong, Richmond Y Mulligan. 2019. Bringing Design to the Privacy Table: Broadening "Design" in "Privacy by Design" Through the Lens of HCI. ACM.
- [92] Richmond Wong, Deirdre K. Mulligan, Ellen Van Wyk, James Pierce, and John Chuang. 2017. Eliciting Values Reflections by Engaging Privacy Futures Using Design Workbooks. 1 (12 2017), 1–26. <https://doi.org/10.1145/3134746>
- [93] DAVID ZELENSKI. 2003. TALENT AGENTS, PERSONAL MANAGERS, AND THEIR CONFLICTS IN THE NEW HOLLYWOOD. *Southern California Law Review* 76:979 (2003), 984.

Received April 2019; revised June 2019; accepted August 2019