"It's Like Learning a Whole Other Language":
The Role of Algorithmic Skills in the Curation of Creative Goods

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There is increasing concern and scholarship about how algorithms influence users' online experiences. Yet, little of the work is empirical in nature, leaving many questions about whether users recognize how algorithms affect their online actions and whether they can address the influence of algorithms skillfully. To address this gap, we draw on interviews with creative entrepreneurs from across the United States to examine the extent to which they understand how algorithms may impact their sales success. Participants reveal varying levels of algorithmic skills, or know-how, when it comes to understanding how algorithms influence their content's visibility. Although many recognize that algorithms affect who sees their wares online, only some know how to set things up so as to improve their chances of reaching potential customers.

Keywords: algorithms, audiences, algorithmic literacy, algorithmic skills, social media, online participation, creative entrepreneurs, Internet skills

How do everyday users of the Internet tackle the challenge of understanding algorithms, the mostly opaque systems that affect what users see and share online? Much has been written about how algorithms play an increasingly important role in people's online experiences, determining what people see on countless websites (Gillespie, 2014; Just & Latzer, 2017; Pasquale, 2015; Striphas, 2015), including the most widely used online destinations, search engines, and social media platforms (comScore, 2016), and how people feel about what they see online (Bucher, 2017). Yet, a significant empirical angle has been seriously understudied (for notable exceptions, see Eslami et al., 2015, 2016; Willson, 2017): how users approach sharing content whose visibility and chance of reaching audiences is largely determined by their understanding of (a) the specific algorithms that determine visibility on search engine results pages and social media feeds; (b) the imperceptible interactions of algorithms in the broader network of websites; and

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(c) the norms and practices that govern users' decisions of what to share, with whom, and where. This study addresses these related issues by analyzing the experiences of more than two dozen creative entrepreneurs from across the United States.

To learn about algorithmic skills, we examine how online sellers attempt to interpret, gain knowledge about, and respond to the invisible algorithms that determine whether potential buyers see their goods, in other words, a process closely tied to their livelihood. In doing so, we make three key empirical contributions as well as methodological advancements. First, we show that creative entrepreneurs are highly motivated to understand algorithms and often make a concerted effort to do so. Second, we show that they respond to their perceptions of algorithms with varied degrees of skill, with the most successful in the group demonstrating the most nuanced understanding of how algorithms on different platforms might work together to help or hinder their success. Third, we argue that the variation in knowledge and ability we find among our highly educated and motivated participants points to the likelihood that those who might most benefit from selling goods online are excluded from full participation based on their insufficient knowledge of algorithms. Given that our respondents have special motivation to understand how algorithms work, these findings are likely conservative when it comes to the lack of knowledge about algorithms across the more general population. Finally, this qualitative study maps a direction, and points to challenges, for future quantitative studies that seek to measure differences in algorithmic skills, the characteristics that predict them, and the outcomes that result from them.

Why Internet Skills Matter

Considerable literature has discussed the importance of algorithms to what content people see online specifically and their online experiences more generally. Given the vast amount of literature on this topic (e.g., Gillespie, 2014; MacCormick, 2012; Resnick & Varian, 1997; Striphas, 2015; Vaidhyanathan, 2011), we take for granted that empirically investigating how algorithms shape people's online experiences is relevant. Here, we locate our empirical study especially in the literature on Internet skills, specifically focusing on people's knowledge of how search engines and social media news feeds work, their attempts to fill gaps in that knowledge, and the strategies people use to manage their audiences on social media platforms.

Although accepted as an important concept, Internet skills are a somewhat contested topic in the literature (Litt, 2013), as various researchers have conceptualized skills in different ways, ranging from perceived competence (Cheong, 2008; Dutton & Blank, 2011) to self-efficacy (Bunz, 2004; Dutton & Blank, 2011; Eastin & LaRose, 2000) to efficient and effective usage (Hargittai, 2002). Regardless of the particular approach, a number of studies have found that people of higher socioeconomic status are more likely to have higher Internet skills (Litt, 2013). This strong empirical correlation is of particular concern given that, in the early days of the Web, scholars expressed misgivings over who might lose out on the benefits of online participation on the basis of economic and geographic barriers to Internet access, and cautioned that simply gaining access to the Internet would not distribute its benefits equally (e.g., DiMaggio, Hargittai, Celeste, & Shafer, 2004; Hargittai, 2008). They argued that the advantages of going online would not erase all previous social inequities; rather, inequalities in Internet use were likely to persist based on those that existed offline. Indeed, research shows that one of the distinctions that persists online is that of

socioeconomic status. Individuals who are more highly educated or who, in the case of children and young adults, have parents who are more highly educated, tend to possess greater levels of skill (Bonfadelli, 2002; Bradlow, Hoch, & Hutchinson, 2002; Gui & Argentin, 2011; Hargittai, 2010; van Deursen, van Dijk, & Peters, 2011).

Understanding the role skills play in creative entrepreneurs' use of social media to sell their goods becomes particularly important given that platforms and popular media often herald the unfettered access such sites offer to buyers for unique products. Lowered barriers to entry incentivize participation from artists who might not otherwise be able to sell their goods (Etsy, 2015; Morgan, 2014; Palmer, 2014); yet, the literature on skills suggests that those lower socioeconomic status artists who most stand to benefit from selling their goods online may face invisible constraints given their potential lack of skills.

What We Know About Algorithmic Skills

Most empirical research regarding algorithms, that is, the "encoded procedures for transforming input data into a desired output, based on specified calculations" (Gillespie, 2014, p. 167), discusses these phenomena in the hypothetical (Introna & Nissenbaum, 2000), is based on anecdotal evidence (Ananny, 2011), uses content analysis to determine how algorithms curate content (DeVito, 2016), or focuses on how users imagine or theorize algorithms (Bucher, 2017; French & Hancock, 2017). This work shows that although algorithms channel user attention (Hargittai, 2000; Webster, 2014), a lack of algorithmic transparency results in confusion and the potential for discriminatory practices (Introna & Nissenbaum, 2000; Sandvig, Hamilton, Karahalios, & Langbort, 2016; Sweeney, 2013). Little empirical research, however, has considered how users both understand algorithms and attempt to produce content that then will be seen by their intended audience (Litt & Hargittai, 2016b).

Selling-platforms, such as Etsy, claim that opening an online shop can lead to considerable rewards for independent artists. To help their sellers, they provide a number of resources to deal with the complexities of making their products visible to potential buyers, particularly through the techniques of search engine optimization (e.g., Rickerby, 2013). This points to the importance of a subset of Internet skills, what we call *algorithmic skills*, which we define as users' knowledge about algorithms and their role in making online content visible, as well as users' ability to figure out how particular algorithms work, and then leverage that knowledge when producing and sharing content. Although literature in this area is somewhat scant, we next discuss how literature concerning information seeking provides a helpful context for research concerning algorithmic skills.

Although written without direct reference to algorithmic skills per se, and perhaps for that reason often ignored in that literature, work over the years about information seeking is directly relevant to this domain. Considerable research has looked at users' ability to search for and evaluate content online (e.g., Hargittai, 2002; Klawitter & Hargittai, 2018; Metzger, 2007; Rieh & Hilligoss, 2007). This stream of literature has found that people differ widely in their ability to find content effectively and efficiently. Some studies have specifically found that users put considerable trust in search engines, Google in particular (Hargittai, Fullerton, Menchen-Trevino, & Thomas, 2010; Pan et al., 2007), suggesting that there is little concern on the part of users that Google manipulates results in a way that may steer them to pages not necessarily

optimal for their query. The main take-away from this line of work for the present study is that users exhibit wide-ranging skills in how to use search engines effectively and efficiently. Although these works did not focus directly on algorithmic skills per se, they did discuss how users understand such platforms and therefore are important for informing related work.

Regarding people's knowledge about social media feeds, of particular note are two papers by Eslami and colleagues (2015, 2016) about how people understand Facebook's news feed in particular. Both papers report on innovative longitudinal work examining algorithm awareness and an understanding of content curation on Facebook. The results reveal that many participants do not know why some posts show up on their news feed and not others. Despite relying on the news feed for information from and about people important to them, most users are not aware of the algorithmic curation that goes into picking the content they are most likely to see.

A final body of work, albeit a small one, considers what strategies users apply to reach the intended audience of content they post on social media (Litt & Hargittai, 2016a, 2016b; Vitak, Blasiola, Patil, & Litt, 2015). In this case, the algorithmic manipulation of content is relevant to the user as content sharer rather than information seeker, which tends to be the case with search engine usage. In line with work on information search, the stream of research concerning content sharing also finds variation in people's knowledge about the various systems they use. There are differing levels of awareness about what to do to reach the most relevant audiences while avoiding suboptimal ones. In these cases, algorithmic skills are important as they help users recognize that actions they take can increase the chances of posted content showing up on relevant people's feeds. But not all users are aware of and implement such actions.

In sum, research examining people's skills in using search engines and social media has found considerable variation in users' level of understanding of how systems that rank content decide how to do so. To be sure, the specifics of many, if not all, such curation algorithms are proprietary and kept confidential. Nonetheless, some information is available about what matters. Knowledge of algorithmic functionality can presumably aid users in reaching their goals with content. We are interested in seeing whether variation in Internet skills extends to the specific domain of algorithmic skills.

Why Independent Artists?

Understanding the experiences of independent artists, such as creative entrepreneurs who make creative goods by hand, is particularly relevant to understanding how differences in users' understanding and exploitation of specific algorithms and algorithmic systems may lead to increased inequality. Because creative production occurs in a market in which people create "symbolic and economic value" dependent on "word of mouth, taste, cultures, and popularity" (Potts, Cunningham, Hartley, & Ormerod, 2008, pp. 169–170), independent artists are highly motivated to engage an audience in order to sell their work (Baym, 2018). In addition, previous research has shown that the production and reception of cultural goods may be stratified on a number of characteristics (e.g., Becker, 1984; Bourdieu, 1984; DiMaggio & Hirsch, 1976; Jenkins, 2006). As entrepreneurs, independent artists work beyond gatekeeping structures of the fine art world. They are, therefore, the type of people who may be most likely to benefit from selling goods online (Becker, 1984; Jenkins, Ford, & Green, 2013). Indeed, ethnographic studies of artists who participate in

online markets reveal artists' belief that they can gain from the seemingly low barriers to entry provided by online markets (Liss-Marino, 2014; Shultz, 2011, 2013). Given perceptions that these platforms offer new, more democratic opportunities for developing a thriving creative business, it is important to see whether such opportunities are equally distributed among those who attempt to use the platforms. In addition, going beyond creative entrepreneurs, if we find differences in know-how among a group that should be highly motivated to understand the systems they use, it is likely that such inequalities are exacerbated among a more representative population.

Data and Method

Given how little empirical work exists on people's algorithmic skills, qualitative methods are the most appropriate for gaining an in-depth understanding of how people perceive algorithms and attempt to manipulate them for their own benefit. Not enough is known about these processes to ensure the sound construction of quantitative measures that could be applied to a larger and more representative sample. Accordingly, we analyzed transcripts from 25 semi-structured interviews conducted in 2015 with independent artists from across the United States. Creative entrepreneurs are a helpful group to study regarding algorithmic skills because they are especially reliant on search engines and social media to curate their content so that potential customers may find what they are selling. They are more likely than most to pay attention to how algorithms work, and any lack of knowledge we find in this group is likely to be higher in a broader sample. Our focus on such a population follows others' work on social media use by creative entrepreneurs (Scolere & Humphreys, 2016).

The interviews were the third phase of a longitudinal multimodal study (2014–2015), which also included 43 surveys in the first phase and collection of participants' social media posts and e-commerce sales data (N = 39) in the second phase (Klawitter, 2017). We restricted the study to U.S.-based women between the ages of 18 and 55 years who use e-commerce websites to sell functional art, defined as handmade pottery, jewelry, and textiles. Limiting participants to adult women 55 and younger allowed us to control for differences in Internet skills that have been shown to be systematically related to gender and age (van Deursen et al., 2011).

Recruitment

Recruitment for the larger study occurred in three waves until we exceeded our enrollment goal of 40 participants who met the eligibility requirements and were evenly distributed across pottery, jewelry, and textiles. To ensure a diverse set of participants, we contacted sellers both in person and through e-commerce websites. In-person recruitment happened at 10 midwestern arts and crafts fairs, both juried and non-juried. Online recruitment involved four popular arts-and-crafts e-commerce sites: Aftcra, Artfire, TheCraftStar, and Etsy. We selected these platforms because they enable U.S.-based artists to sell a variety of goods but are diverse in that they represent a range of e-commerce platforms in terms of the number of shops they house (for more details on the study design, see Klawitter, 2017).

In-person recruitment happened through fliers we distributed at art fairs and e-mails sent to addresses provided in fair brochures or websites. We put great effort into ensuring that we contacted a

diverse set of artists through e-commerce sites including both popular and less popular shops. After hearing from us, artists who were willing to participate were asked to consent to participation and complete a screening survey. Next, we asked those eligible to complete the survey questionnaire, offering a $5 gift card remuneration. Those who completed the social media data collection portion of the study received an additional $10 in gift cards. We invited all participants who completed these two phases of the study to participate in an interview. Of the 39 people we contacted, 25 agreed to partake, receiving another $15 in gift cards. These 25 women made up the sample for this article.

Sample Descriptives

The average age of participants was 41 years, most possessed a bachelor's degree or postgraduate education, and most identified as White (see Table 1). They lived across the United States (see Figure 1).

Table 1. Participant Background.

Variable	N = 25
Female	25
Age (years)	
18–29	1
30–39	9
40–49	10
50–55	5
Median	41
Education	
Some college	5
Bachelor degree	12
Graduate degree	8
Household income ($)	
<25K	3
25K–49.9K	2
50K–74.9K	8
75–110K	6
>110K	4
"Don't know"	2
Race/ethnicity	
African American, non-Hispanic	1
Multiple races/ethnicities	1
White, non-Hispanic	23

Figure 1. Participants' U.S. location. The black marker indicates participants who completed the survey, enrolled in social media data collection, and also completed an interview. The dark gray marker indicates participants who completed the survey and enrolled in social media data collection. The light gray marker indicates participants who completed the survey only.

Approximately one quarter each made pottery, jewelry, or textiles, and another quarter made two or more of these kinds of goods (see Table 2).

Table 2. Types of Handmade Goods.

Types of handmade goods	*N* = 25
Ceramics	7
Jewelry	6
Textiles	6
Ceramics & jewelry	2
Jewelry & textiles	3
All three products	1

Regarding Internet use experiences (see Table 3), on average, participants reported relatively high levels of Internet skills, averaging 4.1 on a 1–5 scale of an index based on knowledge of 10 Internet-related terms (Hargittai & Hsieh, 2012; Wasserman & Richmond-Abbott, 2005).

Table 3. Internet Use Experiences.

Variable	Mean (SD)
Number of devices (1–7)	3.1 (1.0)
Number of access locations (1–10)	5.0 (2.1)
Number of use years (0–24)	15.7 (4.9)
Weekly Web hours (0–42)	16.0 (10.6)
Internet skills (1–5)	4.1 (0.8)

Note. Minimum and maximum values appear within parentheses in Variable column.

The characteristics of participants we interviewed were representative of those who participated in the surveys and social media data collection phases of the study.

Interview Protocol

The interviewer (first author) conducted interviews using participants' preferred mode of communication: 22 on the phone, two using Skype, one using Google Hangouts. The interviewer followed a semi-structured interview protocol customized to match participants' social media and e-commerce activity during the previous phase of the study. These included open-ended questions to elicit information and stories about each participant's experiences using social media and e-commerce websites to promote and sell her work. In addition, the interviewer asked follow-up questions to draw out more detail and to gain clarity (Tracy, 2012). Professional transcriptionists from VerbalInk transcribed audio recordings. Interviews lasted approximately 50 minutes on average and contained 167,245 words.

Because this project concerned participants' professional efforts and creative work, we asked each participant whether she preferred her interview responses to remain confidential or if she preferred us to attribute her words to her (Bruckman, Luther, & Fiesler, 2015). We provide identified direct quotes for those who consented to being identified by name.

Analysis

With the aid of a trained research assistant, we coded interviews qualitatively using the Dedoose software program. We developed a structural coding scheme (Saldaña, 2015) that identified excerpts of interviews that addressed our research questions. The coding scheme included participants' challenges and successes with selling their work online as well as the motivations, training, skills, and routines that enabled them to do so. We read each interview three times and coded them for instances of the above as they related to the broader categories of participants' craft/creative work. We then identified experiences that seemed salient to a number of participants, as well as those that seemed unusual, to illustrate why some participants experienced more success in their online sales efforts than others. Although the concept of algorithmic skills was not the primary focus of the broader study, it emerged as a salient concept through

these analyses. Here, we focus on skills related to artists' desire to increase the visibility of their shops, in particular, algorithmic skills related to search engine and news feed optimization.

Sales Protocol

Using a custom Web-based application and with participants' consent, we collected daily sales data from 37 participants' Etsy shop homepages during the 20-week duration of the study. To calculate participants' sales, we subtracted the number of sales listed on the first day of the study from the number listed on the last day of the study. The average (median) number of sales participants made over the course of 20 weeks was 17. Four participants sold no goods, and one sold nearly 700. Although using these data to perform any sort of quantitative analysis is inappropriate, it does show who among our participants was successful at selling their goods and who was not.

Findings: Algorithmic Optimization

Sellers understood the importance of both search engine rankings and social media news feed prominence for their shops' success, believing that achieving preferred placement on both required active engagement on their part. We call the set of skills associated with boosting the visibility of participants' goods *algorithmic optimization*. Although most participants believed in the importance of visibility for their products for buyers to find and purchase them, many did not know how to increase it. The majority of respondents expressed considerable frustration regarding their ignorance of how e-commerce platforms and social media work when it comes to showcasing products. Although most were confused, some exhibited more sophisticated skills. These participants recognized that various online services use different technological mechanisms to curate content. Overall, most sellers attempted to integrate their admittedly limited knowledge of each platform's requirements into an overarching algorithmic strategy.

Recognizing the Importance of Algorithmic Optimization

Participants understood that to sell their goods, potential customers needed to find their work. Heidi, a maker of textiles and jewelry, exemplified sellers' recognition of this. She said,

> I find [search engine optimization] to always be a little bit tricky so that you're found. One of the things that going into it you think, "Oh, if I have a good product and if I have good photos and I design it well and have a good price on it, that people will just, you know, love my stuff." But if they can't find you, then it's all for naught. So I think for me that's the most challenging part.

In addition to recognizing the importance of optimizing their shop listings for search engines, participants said that they believed they should also use social media to increase their shop's profile. Erin Gallagher, of Erin Rose Designs, said that she recognizes the importance of social media use to increase visibility of her shop, but at the same time, she is not sure how more visits to her blog, measured in "clicks . . . whatever that means," relate to increased visits to her store. She observed,

It has been browbeaten upon most self-employed artists that if you blog, no matter where you blog, or what you blog about, always have a connection to your store. Always talk about your stuff, because it's more Internet hits, it's more clicks, it's more whatever that stuff means. I'm still trying to figure it out. But the more I mention my store online in more platforms equals good, or so I'm told.

Yet, simply recognizing that social media use may be important to increasing their work's visibility does not mean that artists know exactly how to do so. This is especially true when it comes to generating content that social media algorithms reward by highlighting it in other users' feeds. Kim, a potter, said that she has learned through word-of-mouth that the Facebook news feed algorithm may not show all of a Facebook account's posts to everyone who has "liked" her page or "friended" her profile. She speculated,

I guess there's controversy but there's stuff been going around saying that Facebook hides things and not all of your subscribers get your posts and stuff like that. So, I mean that kind of has a negative effect. I'm not sure where my reach is.

Frustration Regarding Lack of Knowledge

Participants appreciated the necessity of increasing the visibility of their work, but they also expressed dismay at their lack of knowledge regarding how e-commerce and social media platforms work and how potential customers find their shops. For example, they said that they are unsure how best to use social media platforms to promote their work. Karen, a potter, said,

I have Pinterest but I'm not sure exactly how to use it. I send my work. I send my work on other sites. It comes back, "Oh, you've made so many free pins," or "People have pinned your work," but when I see some of the pins that people have done, it's stuff that I've posted years ago and it just keeps floating around, and/or it's stuff that I send to other people's sites that's just getting around. Like I said, I don't understand how that works.

Karen's quote demonstrates that she does not know that, using Pinterest, people can pin images they find on various websites that were posted anywhere, and at any time, online. Even though she posted images on the Web "years ago," people can continue to find and save those items to their boards. Moreover, Pinterest allows users to "repin" images from others' boards, giving images the potential to circulate over a long period of time, particularly if the Pinterest algorithm rewards images with more "repins" with greater visibility. Not only does Karen not recognize some of Pinterest's basic functionality, she does not see how the "repinning" of old images may be beneficial to her store when the images are from years earlier. Her use of the phrase "send my work" suggests a lack of familiarity with the system given that is not how users of that platform refer to sharing images.

Nicky, of Lil Brit Knits, revealed the difficulty sellers have following the conventions of different platforms. She talked about her frustration using hashtags on Instagram. Hashtags enable users to tag their posts with keywords for which others may search and thus find sellers' content. She noted, "I haven't figured

out all the hashtags. I've got some of them figured out, and I got some more followers through it. But, yeah, it's like learning a whole other language." In addition to highlighting the importance of platform conventions and their implications for searching social media content, Nicky's comparison to learning a new language also signals just how difficult entrepreneurs find it to master these skills.

Overall, participants showed a general lack of knowledge about how platforms work, what conventions platforms use, and how to leverage them for promotional activities. They expressed frustration over their lack of skills in these domains. This was especially acute when it came to recognizing that they should increase their goods' visibility but did not know how best to do so. On this point, note textile artist Erin's comment: "As far as trying to figure out all the tricks with the [search engine optimizations] and all the tags and all that, I found it pretty confusing." Others were more assured in their pronouncement of how the Facebook algorithm identifies posts to highlight, such as Nicky:

> And now, Facebook or some algorithm decides what posts are important, and that worries me a little bit. I mean, on Facebook, I only have a little over 750 followers, and not all my followers see all my posts, and that's kind of annoying. They used to, I think, see more posts. And now, I don't know, I read somewhere that they only see maybe 10 percent, or something? So, that kind of bothers me.

Nicky's quote illustrates several points. First, some participants recognized that mechanisms exist to promote or diminish social media content. Second, they realized that such mechanisms can change over time. Third, they were perplexed because they do not fully understand how such mechanisms work, but they have witnessed the results of algorithmic selection; that is, not everything they post was seen by everyone in their audience. Finally, participants were frustrated both by the fact that such selection occurs and that they are not sure how to counter it to optimize their content's visibility.

Algorithmic Strategies for e-Commerce Platforms

Although the majority of participants lacked refined skills about how to improve their shops' visibility, a few shared their detailed strategies for optimizing their e-commerce platform listings and social media content. Although these participants could not be certain that their techniques worked to increase shop visits and sales, they were sufficiently convinced to pursue them. These examples illustrate that artists develop strategies to help potential buyers find their products, even though they do not fully understand— and likely cannot understand, given their proprietary nature—the ways that e-commerce and social media platform algorithms select what content to promote.

Some participants said that they renew their listings on Etsy to increase their ranking in search results. Erin, a textile artist, described this practice: "What I find is that once or twice a week I have to repost the same things just so they kind of get to the front of the line again." Others said that they believe this tactic is outdated because Etsy changed its search algorithm. Heidi, a potter who suspended her Etsy retail shop in favor of selling goods from her own website, said, "They changed it so that it wasn't the same way; you couldn't [increase your ranking by relisting your item]." These conflicting accounts show that even

sellers who attempt to stay current on the inner workings of algorithms are uncertain about their strategies' efficacy.

Other participants focused on the importance of using keywords in listings that potential customers would use to search for items. Kim, a jewelry maker who also works as a professional Web designer, noted,

> Based on my professional experience, I already knew that keywords were important when you're listing your items to make them relevant. . . . I would pick stores and then I would go on search and see what would pull up. Was it something similar to what I had and, you know, was it a popular keyword they use in that? And then I would use it.

In addition to researching keywords other shops used for similar goods, participants also based their items' tags on the autocomplete functionality of search fields. For example, Heidi, a textile and jewelry maker, said,

> When you start typing in the search in Etsy, it'll prompt a whole bunch of different … you start typing "vintage buttons or something like that," it'll come up with, like, "vintage sewing buttons," "vintage blue buttons," or whatever. There will be all sorts of things that are suggestions of what people have searched a lot of. So then that's gonna help.

Although most participants struggled with search engine optimization, some had clearly developed helpful strategies in that domain. We found similar savvy among some respondents for improving their social media presence.

Algorithmic Strategies for Social Media

Although most participants expressed confusion over how social media websites promote content, a few participants revealed what they do to increase their posts' visibility in others' feeds. At a basic level, participants said that they try to link to their shops from their social media content consistently, but beyond simply linking to their shops from various social media postings, some participants shared more specific strategies. Crickets, a textile artist, explained one such strategy for using Twitter:

> I guess if you start by having someone at the beginning of your post, then it's not as effective as if you say a word or two and then have someone's [name]. So in other words, if I started [a] post with, you know, "@ [interviewer's name] check this out," exclamation point, it's going to get less exposure than if I said, "Hey, @ [interviewer's name] check this out," exclamation point. . . . They're always making stupid little rules like that.

Although Crickets could not articulate what about Twitter's functionality limits exposure of a tweet that starts with an at-reply up front—only followers of both the poster and the person receiving the reply see it—she had learned to address it in how she interacts with the platform.

Participants also noted the different levels of attention posts would receive based on whether they appeared on personal profiles or public pages, particularly on Facebook. Heidi said that she noticed that her business content receives more social interaction when she posts it to her personal timeline rather than to her business page: "If I post a business-related post to my personal page, I have a lot more interaction." Similarly, Nicky said that she believes that the Facebook algorithm rewards content that keeps users on it, rather than using links to send users to other platforms. She said she changed her strategy for posting her items to her page when she realized this. She explained,

> So I would link out to Etsy, or I would link out to my website. And now I do pure links out. I've learnt that Facebook likes Facebook, so I will save the picture and paste the picture directly, and that tends to get more views than if you link out.

Interestingly, although this strategy may increase the visibility of the post on Facebook and the interaction it receives there, it may not necessarily improve Nicky's chances of selling her items. Confining her links to the Facebook platform may make it difficult for participants to reach the shops she maintains on Etsy and her personal website. Thus, her desire for increased social interaction on Facebook may be a self-defeating strategy for sales.

Integrated Algorithmic Strategies

Participants who have a more sophisticated understanding of how various platforms render content visible create detailed plans for promoting items leveraging their apparent knowledge of how platforms' search and social media algorithms can be manipulated to increase a product's visibility. For example, Crickets, one of our top-selling participants, shared her typical strategy for promoting new textile goods. She claimed that the Etsy search engine rewards trendiness, so she "cluster-promotes" newly listed items, a process she described here:

> When I create a new product or I have a product I'm trying to sell, I will on the same day post [it] to Etsy and then I will post that listing on Pinterest and I will post that listing, a link to that item, on Facebook, . . . at least my personal but, if I think of it, also on my business page. And I will make my husband click on the item. Basically what I'm trying to do is create what I call a "mega-trending item." . . . In other words, if an item gets three views on Pinterest one day and then the next day it gets two views on Etsy and then the next day someone adds it to their Favorites and then three days later it gets a couple of views on Facebook, it doesn't have as much impact [as] if right away it gets lifted and boom, bam, there's hearts, there's views, it's coming from everywhere, there's a sale, you know what I mean? It's like the algorithm tends to be like, "Oh this is of note." So that's why I tend to try the cluster promotion of an item.

Crickets' strategy illustrates that she has noticed how items that receive views are rewarded by increased Etsy search engine rankings. Items rich in attention seem to get richer. She has devised an elaborate strategy to take advantage of this insight as she tries to garner more visibility for her goods.

Discussion

Algorithms have become a staple of how major Internet services function, from search engines to feeds on people's social media accounts as well as recommendation systems on e-commerce sites, news aggregators, and elsewhere (Plantin, Lagoze, Edwards, & Sandvig, 2016). Considerable scholarly commentary exists on the importance of critically thinking about algorithms' effects on user experiences, but very little has examined how this plays out in people's everyday online experiences (see exceptions referenced earlier). This article contributes to this literature by analyzing interview data with more than two dozen creative entrepreneurs about how they understand the role algorithms play in the success of their online shops, and the extent to which they are able to put algorithmic skills to use to manage their audience, increase their shops' exposure, and ultimately lead to more sales.

Participant interviews reveal that optimizing shop listings and social media content for ranking algorithms and audience visibility requires making sense of relatively complex and obscure technological phenomena and then acting on and executing that knowledge the best that they are able. Some participants developed strategies for leveraging algorithms to increase the visibility of their goods, but it is nearly impossible for independent artists to learn exactly how best to use social media and shop listings, given the proprietary nature of the codes involved and their ever-changing systems. Participants recognized that they should develop such skills, but they differed considerably in their related know-how, likely leaving the few sophisticated sellers with higher chances of benefiting from their algorithmic optimization skills.

This study shows that lack of algorithmic skills can impede the efforts of entrepreneurs who participate in digital peer economies. Algorithmic skills are a type of Internet skill, an increasingly important domain of knowing how to use the Internet effectively and efficiently. Digital inequality scholarship has emphasized the importance of including skill differences in understanding who gets to benefit most from their Internet uses. Adding to prior work on Internet skills, this project shows that algorithmic skills are an important component of Internet skills, vary considerably across the sellers of creative goods, and have the potential to result in differentiated outcomes from varying levels of know-how. This qualitative research provides an important basis for future quantitative work that could elicit the relationships between socioeconomic background, Internet skills, algorithmic skills, online participation, and tangible life outcomes (Hargittai, 2008). For example, following the model of knowledge-based measures of Internet skills (Hargittai, 2005; Hargittai & Hsieh, 2012), survey research into algorithmic skills might validate an index of algorithmic skills, which asks respondents to rate their understanding of terms related to algorithms, such as *algorithm*, *search engine*, *search engine optimization*, and *social media feed*, and then relate that measure to antecedent characteristics, participatory activities, numbers of followers or friends, or economic outcomes of participation, such as using the Internet to find a job. Future multimethod studies, such as the one described here, could make algorithmic skills the focal point of investigation measuring sales longitudinally, following a structured questionnaire to help determine whether there is a significant correlation between sales and user skill.

Although creative entrepreneurs are a distinct group and this article is limited by its emphasis on qualitative analysis of interviews with them, our data show that their experiences with algorithms can nonetheless offer important insights into how Internet users in general may struggle with understanding such complex and opaque technologies. Independent sellers of creative goods are more incentivized than

most in understanding how search engines and social media feeds decide what to display to users given that their livelihood directly depends on such exposure. Accordingly, they likely exert more time and effort on getting to know these systems than average users. Despite how crucial such knowledge is to their craft, many creative entrepreneurs still struggle with proprietary systems and lack the know-how to use them in beneficial ways.

Past scholarship has shown that such workers must not only create a product or offer a service, but also must expend effort toward building durable relationships with audiences to facilitate payment for their labor (Baym, 2015). Even when performing these crucial functions, such entrepreneurs often find financial successes elusive (Duffy & Hund, 2015; Dunn, 2015). For example, studies of nonprofessionals who produce social media content regarding fashion, beauty, retail, and sports find that, by building on online following, they are often unable to translate their unpaid creative work into secure employment (Duffy, 2016; Kuehn & Corrigan, 2013). Even popular music and video creators find that turning the popularity of their creative output into financial gains is far from trivial; indeed, "no one is sure how to make money in music anymore" (Baym, 2011, p. 37).

Our participants' comments show that part of the explanation for variation in successful economic outcomes is due to differences in algorithmic skills. Those who can discern and navigate the operations of proprietary algorithms likely achieve greater visibility in the marketplace, and, we hypothesize, are more likely to achieve financial success. In addition, the fact that most of our participants are well educated and have a high level of general Internet skills shows that even relatively sophisticated Internet users, not to mention those who are less well educated and skilled, are likely to struggle when it comes to cultivating an understanding of algorithms that aids success in online markets. This relates directly to the arguments made in the digital inequality literature, whereby the benefits of digital media are most likely to go to those who are already in more privileged societal positions (Hargittai, 2008).

Conclusions

A notable barrier to empirical research into individuals' ability to increase their visibility on platforms that use algorithms to determine what other users see on search engine results pages or in social media feeds is that scholars are not privy to algorithmic code, the decisions that produced it, or the constant tweaks and changes it may undergo (Kitchin, 2017). As others have noted, "knowing" an algorithm is not as simple as opening a black box to discover what is inside (Bucher, 2012, 2017; Gillespie, 2016; Kitchin, 2017; Striphas, 2015), and in fact, once users adopt a similar strategy for making algorithms work for them, their collective efforts diminish its power to sort information. Therefore, determining users' skill or know-how regarding algorithms, which some may argue are fundamentally unknowable, raises important theoretical and methodological questions. Yet, it is still important and necessary to tease out the material consequences of differences in algorithmic skills.

Despite the proprietary, evolving, and complex nature of the algorithms themselves, we find distinctions among users even at the most basic levels of algorithmic know-how. Thus, we argue that users need not possess a computer scientist's or social scientist's level of technical knowledge to gain a competitive advantage in the marketplace. It is not even necessary for us, as researchers, to know whether their

techniques for working in algorithmic systems match the code itself. Rather, this study shows that simply understanding the basics of algorithms—that they exist, that they influence visibility, and that they can be gamed or manipulated if carefully observed—can be a sufficient differentiator when it comes to the material consequences of algorithmic skills.

The overall take-away, then, is that algorithms are very hard to grasp for people; most users likely do not appreciate just how big a role they play in what they see online. Algorithmic skills remain the domain of a select few users, even among the most highly motivated. It is imperative that future work considers how other groups of users understand and address the constant algorithmic curation of their online visibility.

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