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Algorithmic Circulation: How Content Creators Navigate the Effects of Algorithms on Their Work

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Abstract

This article examines the role that algorithms play in circulation and content strategy. Arguing that algorithms are changing how content creators think about content strategy and circulation, this article introduces the idea of algorithmic circulation to describe how content creators navigate the effects of algorithms on their work. The term algorithmic circulation describes the processes by which creators may plan for their content to be taken up or boosted by algorithms through iterative processes of navigating, adapting, and reconfiguring their content strategies. Ultimately, such a shift in thinking about circulation and content strategy has implications for pedagogy, where teachers must be aware that successful algorithmic circulation requires students and practitioners to adapt their content strategies tactically, pay attention to algorithmic audiences, imagine intertwined algorithmic and human agency, and navigate uncertainty with grit and determination.

Keywords: algorithm; circulation; content strategy; content creator; social media; audience

As social media platforms gradually make the switch to algorithmically generated feeds, such shifts precipitate changes in how writers make content for these platforms. Namely, writers must be aware of "algorithmic audiences" (Gallagher, 2017). Algorithms that decide what is or isn't relevant socially (referred to by Gillespie [2014] as *public relevance algorithms*) now dominate social media. Such algorithms are ubiquitous, opaque, and, as oft cited by frustrated creators, extremely dynamic. These constantly emerging technologies and communication practices call for researchers to examine the impact of algorithms on everyday content creation and management across social media. Although the human impact of algorithms has been explored in other fields (see work by Safiya Noble [2012, 2018], Frank Pasquale [2015], and Taina Bucher [2018], for instance), ours is just beginning this trajectory.

Through case studies of four content creators with growing influence, this article will focus on the ways that practitioners circulate content via algorithms in their everyday content strategies. Collectively, the content creators in this study use YouTube, Facebook, Twitter, and Instagram to circulate content about cars and automotive modification, plus-size cosplay, art/illustration, and higher education. Research questions for the study include:

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- How do practitioners navigate the effects of algorithms on their attempts to create successful online content?
- How do practitioners try to "game the system" of a platform?
- What strategies do practitioners use to understand the opaque systems that algorithms create?

In response, results indicate that participants in this study:

- understand algorithmic activity through varied means, including experimentation with content, and optimize their content accordingly;
- reference joint algorithmic and human agency as a factor in content success; and
- navigate uncertainty and frustration regarding algorithmic governance of content.

Results show that algorithms are changing how content creators think about content strategy and circulation. Specifically, algorithms impact how writers perceive their own agency; how writers must be resourceful as they rely on a wide variety of methods for gleaning information about the opaque systems that algorithms create; and how writers must construct content experiences that appeal simultaneously to both their human and algorithmic audiences in the midst of uncertainty. To describe the emerging ways that practitioners are encountering the effects of algorithms on their content, I introduce the concept of *algorithmic circulation* (drawing largely on Gallagher's [2017] *algorithmic audiences* and Edwards' [2017] *tactical rhetorics*). The process of algorithmic circulation is also dependent upon the belief that rhetorical success must be engineered by creators who are caught up in complex and chaotic networks of human and nonhuman actors (Sheridan, Ridolfo, & Michel, 2012), of which public relevance algorithms are one (Gillespie, 2014). Additionally, because of algorithms' opaque nature, a level of uncertainty is always present in the process of content circulation via algorithmically mediated spaces.

Thus, algorithmic circulation can refer both to the processes by which algorithms invisibly mediate and distribute content in online spaces as well as to the ways in which creators may plan for such kinds of circulation by navigating, adapting, and reconfiguring their content strategies. While it is certainly possible for users to participate in algorithmically mediated spaces without being aware of or being uninterested in algorithms, algorithmic circulation implies a practitioner's consciousness of algorithmic mediation and a subsequent need for content optimization. Ultimately, I argue that the idea of algorithmic circulation can help us as researchers and teachers better describe and understand how practitioners navigate the effects of algorithms on the success of their content.

In this article, I first review recent research that has laid a theoretical foundation for considering algorithmic circulation, namely: the place of tactical rhetorics (Edwards, 2017) and algorithmic audiences in algorithmic circulation (Gallagher, 2017); human versus algorithmic agency regarding success of content; and the role of uncertainty in algorithmic circulation. I then introduce a working definition of algorithmic circulation. After briefly offering a description of methods (interviews and social media content analysis), participants, and contexts, I end by arguing how successful algorithmic circulation requires students and practitioners to adapt their content strategies tactically (Edwards, 2017), pay attention to algorithmic audiences (Gallagher, 2017), imagine intertwined algorithmic and human agency, and navigate uncertainty with grit and determination.

Algorithmic Circulation

The fields of composition and technical communication have long been interested in issues of circulation (Cooper, 1986; Trimbur, 2000; Mathieu & George, 2009; Ryder, 2010; Gries, 2013; Simmons, 2018; Penney & Dadas, 2013). Recently, scholars have studied the ways that circulation can be harnessed for more sinister means, particularly in the wake of the 2016 U.S. Presidential election, other global elections, and scandals such as Facebook's involvement with Cambridge Analytica (see work by Woolley, 2016; Lacquintano & Vee, 2017; Kreiss, Lawrence, & McGregor, 2017; Kriess, & McGregor 2017; Ferrara, 2017; Bessi & Ferrara, 2016).

In this article, I build upon this rich interest in circulation by introducing the idea of algorithmic circulation to help describe the emerging ways that content creators navigate algorithmically mediated spaces. The idea of algorithmic circulation does not claim that algorithms are the only actors responsible for flows of content—it merely seeks to better understand how public relevance algorithms (Gillespie, 2014) as emerging and increasingly ubiquitous technologies impact the work of doing and teaching content strategy with respect to circulation.

Tactical Rhetorics and Algorithmic Audiences in Algorithmic Circulation

First, harnessing algorithms to circulate content successfully requires that writers be tactical in their content strategies (Edwards, 2017). Tactical rhetors are not necessarily locked into a mindset of thinking of circulation as happening in the future, but instead ask questions about how the past and present affect circulation: "Not only do tactical rhetors keep their eye forward on futurity, imagining how a particular intervention might play out, but they also keep their eye on the back flow of circulation, adapting and forging anew from what's already in motion" (Edwards, 2017). Although tactical rhetorics may be employed to "to disturb and resist dominant regimes," in algorithmic circulation, a creator may more broadly take up "a kairotic mode of doing. . . respond[ing] and interven[ing] in timely and appropriate ways" or "deploy rhetorical techniques of all kinds in their efforts to effectively 'make do' with what's available" (Edwards, 2017). Most importantly, creators who are tactical see circulation as not tied only to the future, but instead incorporate their analyses of the past and present into their content strategy as they navigate, adapt, and reconfigure that strategy on the fly. Indeed, as they navigated the uncertain waters of algorithmic circulation, the participants in this study employed tactical techniques as they experimented with and carefully tracked the success of their content across time. Working in spaces whose capital is algorithmically modeled social relevance and where that model is constantly dynamic, content creators must be *mêtic* in an adaptive intelligence sense, "able to adapt to changing and unpredictable fluxes" (Edwards, 2017).

Second, algorithmic circulation necessitates that creators attend carefully to the needs of algorithmic audiences (Gallagher, 2017) that are as opaque as they are dynamic. The idea of algorithmic audiences is useful because it details three ways in which a creator must adapt their content and content strategy to appeal to an algorithm: Creators must "identify and investigate the values of an algorithm's designers, programmers, and architects" (Gallagher, 2017, p. 31); "manage and curate data that algorithms can process, such as tagging, search functionalities, and qualitative affordances" (Gallagher, 2017, p. 31); and finally "anticipat[e] how audiences might read and distribute texts" (Gallagher, 2017, p. 33) in ways that are very much reminiscent of Jim Ridolfo and Dànielle Nicole DeVoss's (2009) ideas about composing for recomposition. The content strategies of the creators in this study utilized the techniques that John R. Gallagher (2017) describes to make their content perform in desired ways with their imagined algorithmic audiences.

Human Versus Algorithmic Agency in Success of Content

Third, the idea of algorithmic circulation adopts a perspective that sees the success of content as dependent upon humans, algorithms, and other nonhuman agents. Scholars have long questioned whether algorithms largely influence our online experiences, or whether we as users are equally as influential because social relevance algorithms can only function with human feedback. As the results of this study will show, participants often referenced an intertwined human and algorithmic agency that they perceived affected the success of their content.

However, some studies show that algorithms may be perceived as more agential than users. In this paradigm, algorithms are depicted as "conductors orchestrating interface happenings [that]. . . make things happen and affect change within machine processes and human behaviors" (Beck, 2016). Some users may also view themselves "as having no influence on algorithmic personalization," and in users' perspectives, "algorithms take on the supervisorial role of rigorously deciding what users get to see and not see" (Skrubbeltrang, Grunnet, & Tarp, 2017). Others raise concerns about whether algorithms and the engineers creating them have been afforded the power to decide what is relevant and irrelevant socially, culturally, and politically (Hallinan & Striphas, 2016). Some have even interpreted the now-defunct Facebook Edgerank algorithm as "a consistent formula that makes it possible to analyze it as a moral grammar" (Birkbak & Carlson Bang, 2016). These arguments also resonate with work that argues for coding as a rhetorical activity (Brock & Mehlenbacher, 2018) and for coding values and conventions as contextual (Vee, 2013).

Other paradigms envision algorithms working with people and nonhuman actors (Latour, 2007) to mediate content. The belief that algorithms are dependent on humans, among other actors, for their behavior has important implications for how we do research. That is, because an algorithm may create a tailored experience for a researcher based on known information (personal, demographic, etc.) and traces of actions, researchers studying platforms must make careful choices and acknowledge that the content they study on those platforms is mediated by a network of actors—including algorithms (Gruwell, 2018). Human action causes algorithms to be "made and remade in every instance of their use because every click, every query, changes the tool incrementally" (Gillespie, 2014, p. 173). This paradigm sees agency "on a shifting continuum between users and algorithmic processes [rather] than as swinging between user-directed

or algorithm-directed influence" (Hocutt, 2018). Algorithms are important actors within the complex and chaotic networks (Sheridan et al., 2012) that users must navigate when circulating content to meet their goals; within these networks, success is dependent upon both human and algorithmic agency. Overall, algorithmic circulation adopts a view of agency as a spectrum where and humans, nonhumans, and algorithms work together in networks to mediate content.

The Role of Uncertainty in Algorithmic Circulation

Finally, a key element in algorithmic circulation is uncertainty. While scholarship has long been focused on the ways that writers and creators can anticipate circulation (e.g., Ridolfo & DeVoss, 2009), a less explored idea is that there will inevitably always be an element of uncertainty in any circulation process, as circulation itself "is largely beyond a designer's control, unlike distribution, which is a deliberate process" (Gries, 2013, p. 344). In digital spaces and, I argue, particularly in algorithmically mediated spaces, "content creators can ultimately exert only partial control over the places their content goes and the forms it takes" (Dush, 2015, p. 176). After all, when writing for algorithmic audiences, "no approach is singularly correct" (Gallagher, 2017, p. 28). Uncertainty looms large when creating content handled by algorithms, whose agency is involved in invisibly determining flows of content. Algorithmic circulation allows for the fact that a creator might not actually know the right answers to the following questions, but might instead guess and experiment with answers:

- Who [or what, in the case of an algorithm] is interested?
- Why do they [or in the case of an algorithm, it] want to recompose my work?
- What will they [or it] produce?
- How might it be delivered?
- How might I work to facilitate this?
- What genres and mediums will the works potentially transcend?
- And what will the temporal lifespan be? (Ridolfo & DeVoss, 2009)

Algorithmic circulation urges an embracing of the uncertainty regarding the opacity that algorithms create and of the perception on behalf of creators that they may indeed be only partially in control of how their content circulates.

Definition of Algorithmic Circulation

Algorithmic circulation is dependent on three beliefs:

1 Content creators must be tactical (Edwards, 2017) as they circulate content with algorithmic audiences (Gallagher, 2017) in mind
2 Success must be engineered by creators from within a complex and chaotic network of actors (Sheridan et al., 2012), within which public relevance algorithms (Gillespie, 2014) have become a major factor
3 Uncertainty is essential to the process of circulating content in algorithmically mediated spaces

I offer this definition of the term: Algorithmic circulation refers to how creators may plan for their content to be taken up or boosted by algorithms through iterative processes of navigating, adapting, and reconfiguring their content strategies. This concept of algorithmic circulation can help describe the ways in which practitioners encounter and navigate the effects of algorithms on the success of their content. In an age of algorithms, creators must be tactical as they pay attention to algorithmic audiences, create content experiences that will attend to both human and algorithmic needs, and deal with the uncertainty of circulation in algorithmically mediated spaces.

Methods and Participants

Methods for this study included interviews with practitioners as well as analysis of data from their cross-platform content strategies. The participants in this study are a convenience sample recruited from across multiple channels, including an email invitation sent via the NEXTGEN listserv and contacts acquired from connections across various

personal and professional networks, who were largely recruited via in-person, email, and social media conversations. Before gathering data from participants' content across social media, I first interviewed participants about how they created content for social media and their perceptions about how algorithms influenced their content. I interviewed a total of 4 (N = 4) practitioners and collected social media data from a range of platforms including YouTube, Facebook, Twitter, and Instagram. Out of all the platforms used by my participants, Instagram was the most popular, with 3 out of my 4 participants claiming that Instagram was the main platform they used. All participants names are changed for privacy purposes. As a reciprocal measure and in hopes that it might be useful for the work they did for social media, I provided participants with a report on the aggregated data that detailed general trends in creator experiences with algorithms, creator perceptions of algorithmic effects on content, creators' strategies for optimizing content's performance with algorithms, creators' strategies for discovering information about algorithms, how much time creators spend optimizing content for algorithms, and further resources for optimizing content for algorithms. These results are limited in that, being case studies, the experiences of these content creators are not generalizable to all situations. That being said, the trends in their experiences bear paying attention to for teachers and researchers interested in practitioner work.

Participants

Sam's foray into managing his automotive- and mod-focused YouTube and Instagram accounts began as a hobby. While he originally began posting car-related content on his personal Instagram, after seeing that there was a community interested in such content, he branched out and created a separate Instagram and Youtube for his content. Now, he regularly attends car shows in his area, is part of the automotive community, and sources his content from his own personal connections, experiences, and interests. On YouTube, he has over 750 subscribers, and on Instagram he has over 2000.

Cara manages Instagram, Twitter, and Facebook accounts for a higher education honors program. This is a part time job for her while she studies at the graduate level. The goals of the program's social media are "to promote opportunities and to engage our students" (personal communication, July 2018). As such, she defines success for the social media accounts as "people engaging with the content, reacting, commenting, sharing. . . but then also. . . continued growth" (personal communication, July 2018). The program's Twitter has over 500 followers, its Instagram has over 150, and its Facebook page has over 500 likes.

Emma's two main Instagram accounts focus on her professional illustration/art business and her cosplay adventures. She also has a Facebook page devoted to her illustration business, but does not update it often because she feels Instagram is better suited to her work because of its predominant focus on images and aesthetic. Originally, she posted both her illustrations and her cosplay on one Instagram account, but became concerned that her audience for the illustrations would find the cosplay images unprofessional; thus, she made a different account for her cosplay. Emma's cosplay account has over 1400 followers, and her professional illustration account has over 700.

Andrea uses Instagram to document her professional cosplaying. She also is the administrator of another cosplay page dedicated to featuring the work of plus-size cosplayers. Having an Instagram account where she documents things like building her costumes and going to conventions helps her build her reputation in the community as well as helps her get invited to events as a guest, which can lead to better opportunities for monetary compensation. Her main cosplay account has over 6400 followers, and the plus-size cosplay account she manages has over 4500.

Importantly, while all the content creators in this study might like to make such content creation their full-time job, managing and creating content for social media is for all of them akin to part-time job or hobby.

Case Study Results

Creators Understand Algorithmic Activity Through Varied Means, Including Experimentation With Content, and Optimize Their Content Accordingly

Participants used a variety of methods to understand the effects of algorithms on their content. Because experimentation was a common method of trying to understand what "works" with an algorithm, participants' observations about how to achieve success in algorithmically mediated spaces often overlapped with their strategies for optimizing their content. In other words, creators' techniques for optimizing content for and understanding algorithms are closely linked through a process of experimentation and observation of strategies that improve their content's performance;

such processes are indicative of algorithmic circulation in that they involve tactical approaches to strategizing (Edwards, 2017) that involve high levels of observation and experimentation, often with uncertain outcomes.

Participants used the following methods to understand or discover information about how an algorithm was currently ranking content:

- experimenting with different strategies
- corresponding with contacts in the content management business to share tips and tricks
- following and participating in discussions on social media about updates to algorithmsand how creators perceived the resulting effects on the success of their content
- searching for information on questions or issues
- reading content-management-related blogs and other sources

Based on their observations and discoveries from experimentation and other methods, participants then used a variety of wide-ranging strategies to help their content perform well with a platform's algorithms, many of which reflect Gallagher's (2017) conceptualization of how to attend to algorithmic audiences' needs, including:

- continued experimentation
- avoiding genres or phrases known to be algorithmically downgraded
- generating engagement via interaction with "real world" communities
- interacting with other creators' content regularly
- following hashtag themes related to current events, using platform specific hashtags (e.g., #throwbackthursday), or using community specific hashtags
- utilizing metadata to appeal to targeted rather than broad communities
- prioritizing consistent account activity and posting
- utilizing built-in platform insights and analytics to gauge effectiveness of content
- tagging other creators in content
- emphasizing strategies for drawing in initial engagement and eliciting continued engagement with content
- following popular trends in content

In what follows, I detail examples of the role of experimentation in participants' processes of understanding algorithmic activity. I also use examples to illustrate methods of algorithmic optimization that participants perceived improved the success of their content.

Experimentation

For most of my participants, a tactical (Edwards, 2017) process of experimentation, observation, and recalibration of content was important when trying to discern the workings of a platform's algorithm(s). Sam described his process of learning what worked with a particular algorithm as "a constant experimentation" (personal communication, July 2018). A large part of this constant experimentation was also observing what other creators were doing:

> I just kind of look at it as far as trends. What kind of content is very big right now? What is popular? What are people watching? Why are they watching it? Was it suggested to them through the algorithm? What are people clicking like on on instagram? Did a current event just happen, so now the American flag is very popular? That's really the only way I have to really analyze the current trends. (personal communication, July 2018)

It's interesting that Sam mentioned that this observation and experimentation is the "only way" he has to analyze trends. The metaphor of algorithms as black boxes fits his experience well—users can observe algorithmic input and output, but their view of what happens in between is shrouded. Users can only guess what variables—metadata, engagement, etc.—algorithms use to rank relevance of content.

Similarly, when Cara was hired for her job, she says that she "just started kind of throwing content as [she] was learning about the program" (personal communication, July 2018). That changed as she started to get a better feel for what kinds of content performed well and what kinds did not. For instance, she noticed that event reminders and text-heavy posts performed poorly on Facebook, and attributed it partially to the algorithm's influence. She also perceived that "the more posts that you post that don't get good engagement and don't get good reach, the less your

more algorithmically enhanced posts won't reach as many people either" (personal communication, July 2018). Her approach to discovering what worked and what did not was a cycle of experimentation and observation.

Emma also experimented with strategies and content to improve her content's ranking in Instagram's algorithm. For instance, she spends more time liking, commenting, and otherwise interacting with other users' content than she does posting her own content. She described the process as becoming part of a community, helping to get other similar artists to "notice" her work. While she felt that this interaction on her part improved her algorithmic ranking, she also emphasized that she did not like others' content only out of a motivation to be noticed, but also because she was genuinely interested in their work (personal communication, August 2018).

For all of my participants, experimentation and carefully observing which strategies led to algorithmic success was a large part of how they understood the working of algorithms themselves. Based on their observations, participants would often resort to methods of algorithmic optimization they knew helped their content succeed. This tactical approach (Edwards, 2017) in the face of uncertainty is what characterizes these creators' content strategies as planning for algorithmic circulation.

Optimization

Based on their observations and experimentation with content strategy, participants also utilized methods that they perceived as optimizing their content for a particular platform's algorithms. Particularly, this optimization often involved an acknowledgement of algorithmic audiences (Gallagher, 2017), and in the following examples I showcase participants use of metadata in particular to optimize content. This was a dynamic process for both participants that was performed during the tactical experimentation activities described in the earlier section.

As an example, both Andrea and Emma emphasized the importance of using metadata like hashtags to appeal to particular communities where they perceived that their content was likely to generate more engagement and be ranked more favorably with a platform's algorithms. For instance, as an artist and aspiring professional illustrator, Emma emphasized the #inktober hashtag, which artists use to tag their content for an annual art challenge in October every year. The #inktober challenge (Fig. 1) asks artists to do and post "one ink drawing a day the entire month" (Inktober, 2018).

The following is some art that Emma has created for the #inktober challenge (Fig. 2):

In posting for #inktober, Emma usually says what day of the challenge it is—i.e., "Day 4," "Day 5," etc.—in addition to a short description and a plethora of related hashtags. While she includes metadata regarding the content of her art (such as #pumpkinpatch, #spooky, etc.), she also utilizes other hashtags that may be relevant or *kairotic* at the moment. The #drawlloween and #drawlloween2018 hashtags (another popular tag for Halloween-related art on Instagram) are examples of this strategy.

For Emma, posting content to participate in #inktober helps her optimize her content in numerous ways. Using metadata, it helps her label her content as part of an active online community; because #inktober is a recognizable, limited-run event, it also draws additional engagement and interest from audiences. Finally, because part of the challenge of #inktober is to post once a day, it helps her prioritize consistent posting and account activity, which she perceives as helping her overall ranking in Instagram's algorithm.

Andrea, also, frequently uses hashtags to circulate her content to the right communities and get the engagement she needs. Particularly, she pays attention to community-specific hashtags that are currently popular, as such hashtags are dynamic. She brought up the #cosplayvscharacter hashtag as an example of one she creates content for on a regular basis. In this hashtag, the creator/cosplayer is shown in a side-by-side comparing their cosplay to the character it is emulating, thus the "versus" part of the hashtag (Fig. 3).

Using the #cosplayvscharacter hashtag allows Andrea to get her content to the right audience to solicit engagement, while also allowing her to capitalize on conversations in the community that are ongoing and active. In other words, it allows her to take advantage of *kairotic* moments.

Part of the reason that using the right metadata is so important for these creators is that they want to get their content to the communities that will interact with it, thus boosting their content's algorithmic ranking and hopefully encouraging it to circulate to even more people in algorithmically mediated spaces. Sam mentioned the pitfalls of not using strategies to boost engagement:

> . . ..a couple times. . .I've just put the right tags and the algorithm suggested my photo to others on Instagram. But other times maybe I've put a tag that was very generic and it didn't really help my content, and so it never

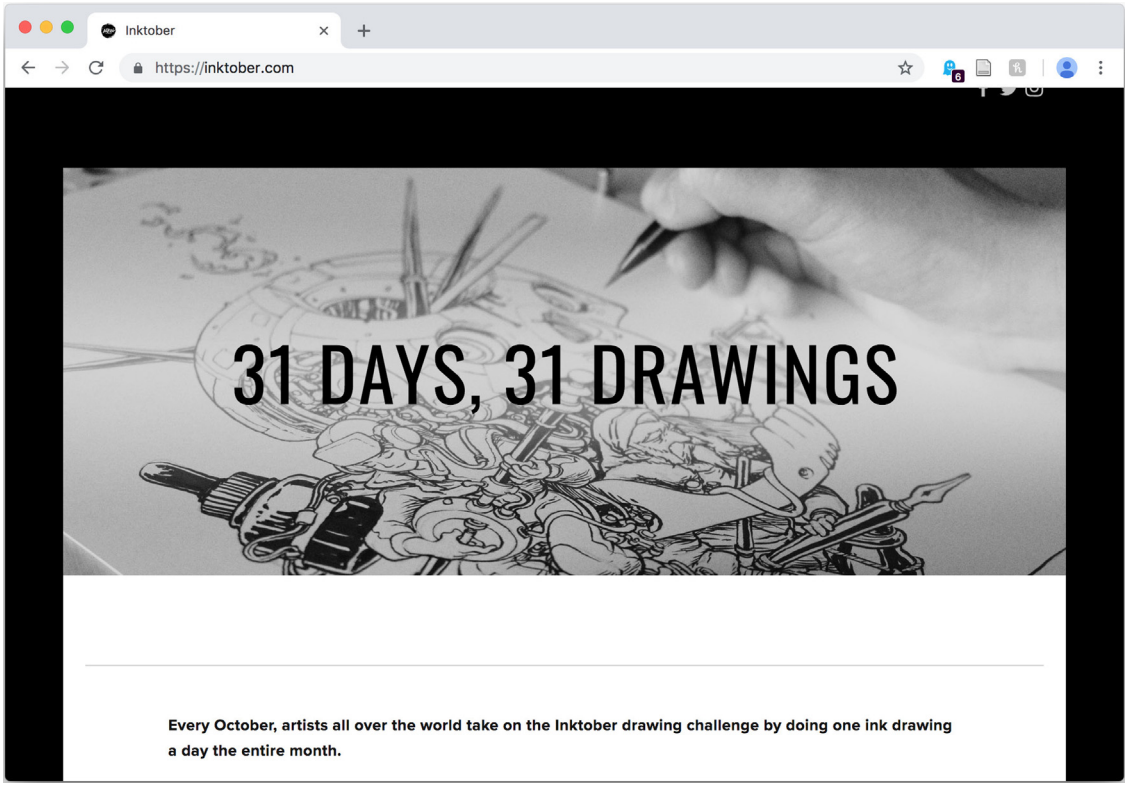

Fig. 1. The Inktober website challenges artists to do a drawing a day.

> really got shared to anybody just because it was so generic—like #video. There's probably millions of posts with that, and your content just gets lost. (personal communication, July 2018)

In other words, one way creators might optimize their content to perform well with an algorithm is to take steps to ensure engagement by targeting specific audiences of users. This optimization strategy brings up an another important feature of algorithmic circulation: The issue of how participants perceived joint human and algorithmic agency as determining the rhetorical success of content in algorithmically mediated spaces.

Creators Reference Joint Algorithmic and Human Agency as a Factor in Content Success

Participants often perceived that a joint algorithmic and human agency played a large role in the success of their content. They assumed that user engagement was a variable that was often heavily weighted for algorithms across the different platforms they used. For them, getting engagement (or not) from their audiences often equated to whether or not they felt the content would be as successful or circulate as widely as they wanted.

For instance, Andrea realized that when she posted cosplays of characters for which there were large online communities, she gained followers and her content garnered a lot of engagement. In her mind, such success was attributable to the favorable ranking that lots of user engagement gained her with the algorithm. However, she is currently taking a break from social media for personal reasons, and she stated that she knows that her inconsistency of posting and the lack of regular engagement is going to make her content perform poorly with the algorithm: "When I get back I probably am going to not even be able to get 100 likes, and for having 6000 followers that's ridiculous, but I know the algorithm won't be showing my work because I took such a long break" (personal communication, August 2018). The implication here is that, even though human and algorithmic agency may be intertwined, there are other variables that may made an algorithm downgrade content and show it to fewer users.

Cara also noted that a string of poorly performing posts in terms of user engagement and reach seemed to lead only to more poorly performing posts: "I've found that the more posts that you post that don't get good engagement and

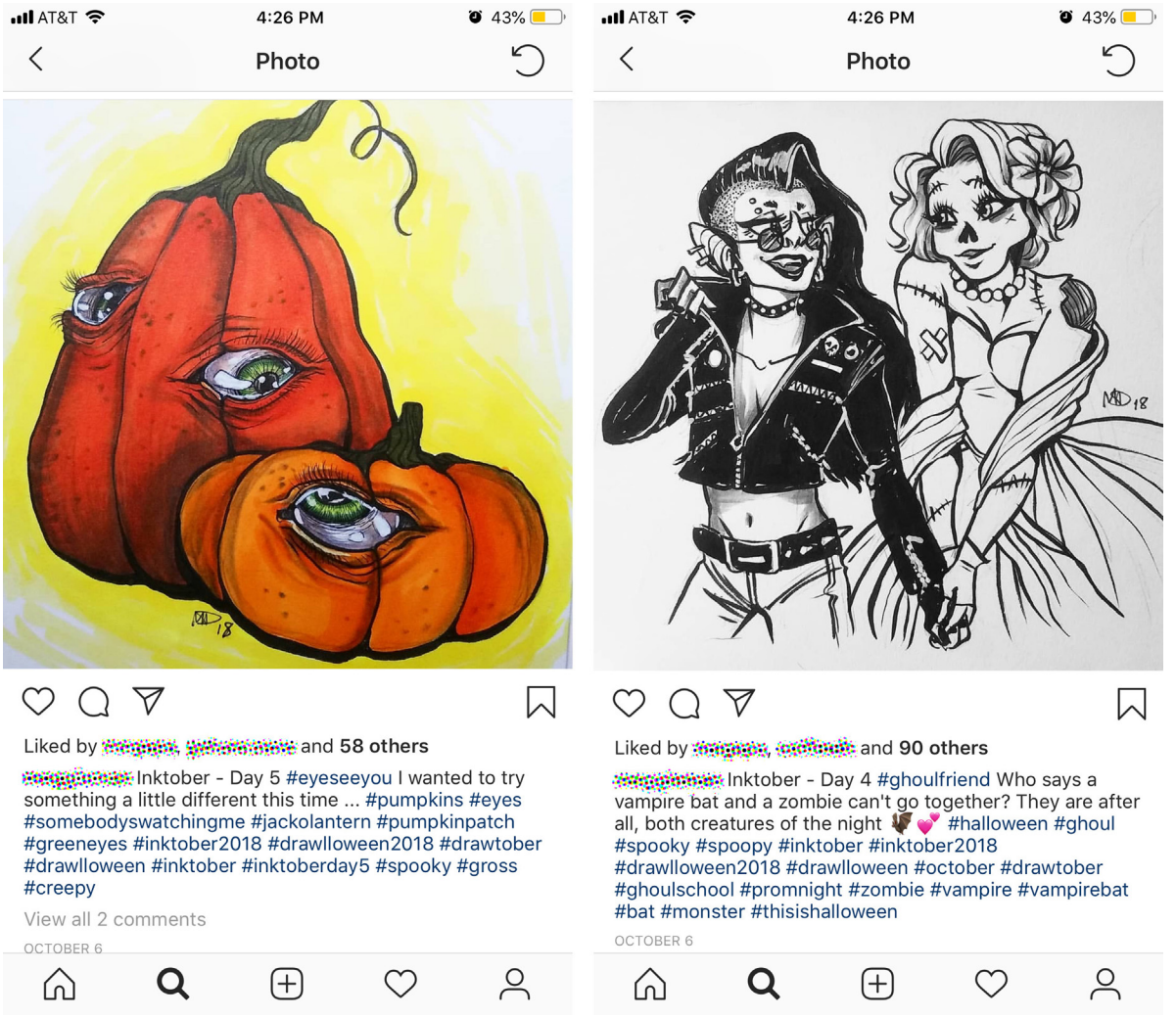

Fig. 2. Examples of the ways in which Emma uses metadata to circulate her content via algorithms.

don't get good reach, the less your more algorithmically enhanced posts won't reach as many people either" (personal communication, July 2018). Sam felt similarly, observing that "the audience interaction for YouTube and Instagram definitely boosts you in the algorithm" (personal communication, July 2018). Since he noticed this trend, he also tries to get human engagement on all of this content in various ways:

> It's huge to have the audience engage in your content. In videos, I'll say "comment below," "let me know what you think," or, "What do you think I should do next?" Try to get them involved somehow or another in a video. With a picture, sometimes I'll just say "comment below," but it's usually like you can ask a question or just say something that they can respond to, even if it's a rhetorical question. (personal communication, July 2018)

For same, garnering user engagement was crucial, and he used various strategies (that are widely used across social media) to get that engagement.

Emma also perceived that her interaction with other creators boosted her content algorithmically. However, whether that boost was because people returned the interaction or because the algorithm perceived her as being more active and boosted her content accordingly (or both) is unclear. Regardless, whether my participants were soliciting engagement from others, trying to participate in active communities, or engaging with others themselves, they clearly saw human engagement as being tied to algorithmic success. Moreover, they also saw algorithmic boosting of their content to

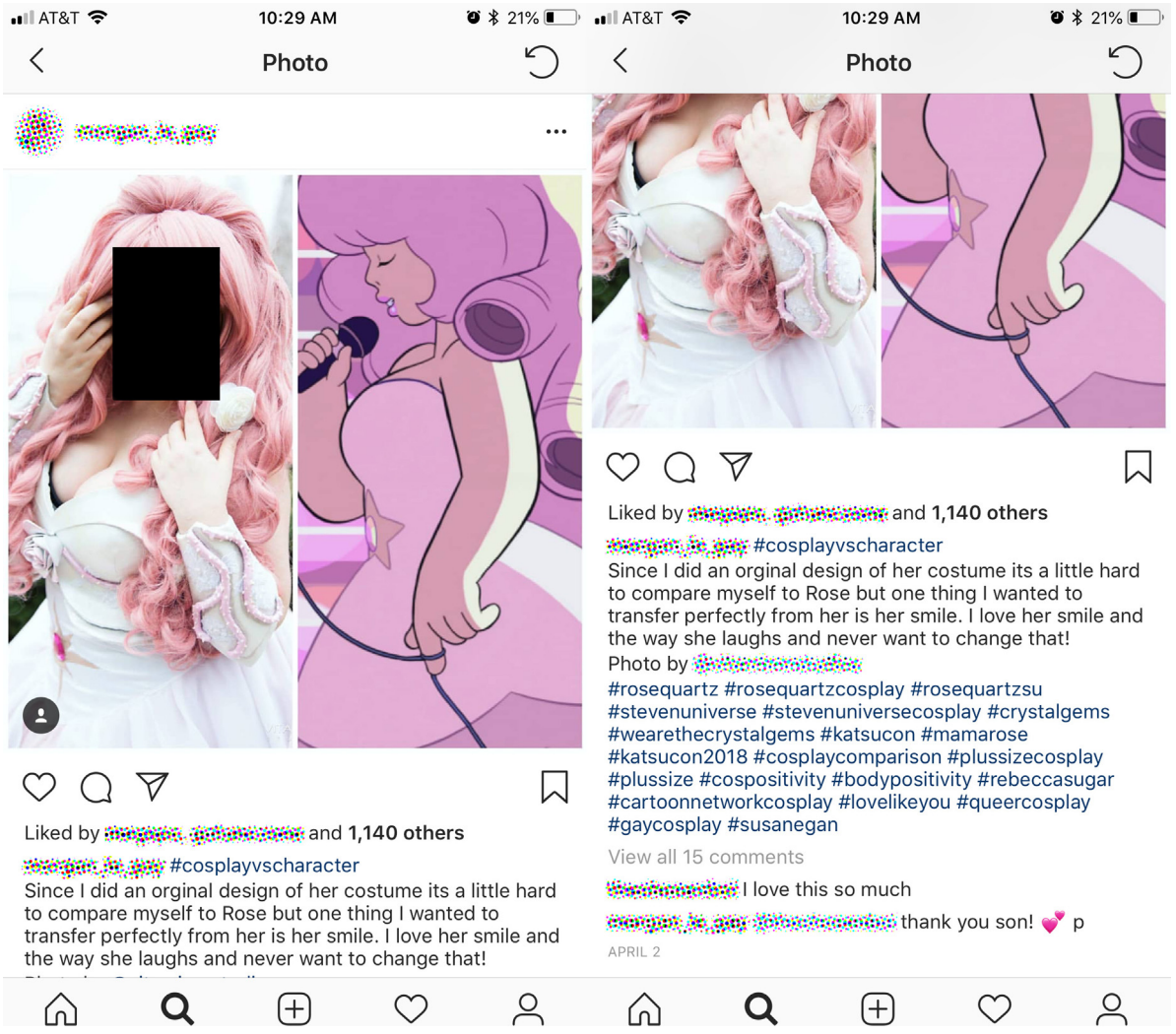

Fig. 3. Examples of the kind of content Andrea posts for the #cosplayvscharacter hashtag.

audiences as being partly dependent upon some variables that they had partial control over (e.g., soliciting engagement) and also partly dependent upon variables over which they felt they had little control (e.g., their content getting downgraded if they took a break from social media). In some cases, they felt that they had a lack of control over their content's performance that was ultimately unfair, frustrating, or confusing.

There are a number of questions that these implications raise about the assumptions that practitioners can fairly make about how heavily weighted engagement is as a variable in algorithmic decision making. In other words, how much does engagement "count" when the algorithms of various platforms are deciding who and when to show content to? Furthermore, if it is the algorithm that chooses who to show new content to, how does it decide who to show it to when there has yet been no engagement with content? What variables factor into these decisions? Does the success of previous content lead to the algorithm showing your future content to more people, as Andrea perceived in her experience? And, if it does, how does an algorithm first determine who to share your content with? Follower count? How often you engage with others' content? The possibilities seem nearly endless, and, when content creators are trying to reverse engineer success, it might easily lead to a set of very dizzying and chicken-and-egg-esque assumptions about how algorithms and human engagement work together. However, my participants' assumptions about human engagement being a weighted variable in the algorithms is certainly correct to some extent.

One defunct example of an early public relevance algorithm is Facebook's Edgerank, which used *affinity* to measure how much users liked a particular type friend (estimated presumably by how often they interact with each other and each other's content) as one of its three main variables (along with *weight* and *decay* [$\Sigma = u_e w_e d_e$]) to decide how to algorithmically personalize content for users. As Cathy O'Neil (2016) asserts, those who develop public relevance algorithms "routinely lack data for the behaviors they're" trying to calculate or estimate, "so they substitute stand-in data, or proxies" (p. 17). Human engagement (via liking, commenting, sharing, etc.) as a proxy to measure users affinity for content has been used before and likely continues to be heavily used as a variable to determine users' interest by various edge providers in various kinds of content, whether for social or advertising purposes. Still, such assumptions stand as an example of the ways in which "the mind of the public" (Gillespie, 2012) is being modeled mathematically—and maybe even problematically—by algorithms. The participants in this study were frustrated, confused, or felt their content had been treated unfairly when their vision of the "mind of the public" didn't match up with the algorithm's.

Creators Navigate Uncertainty and Frustration Regarding Algorithmic Governance of Content

Participants had mixed feelings about the ways they perceived algorithms mediating their content and ultimately affecting its success. Both Cara and Andrea described themselves having "love/hate" relationships with the algorithms on the platforms they used. All of my participants were pleased whenever they felt that their content had been "picked up" by the algorithm of a platform, but they all were equally as frustrated when their content performed poorly, which they blamed somewhat on algorithms. Much of their frustration was also the fact that they could not see the reasons why their content's relevance had been downgraded—in other words, they had to continually overcome the uncertainty attached to the process of algorithmically optimizing their content.

For instance, Sam felt that content from accounts with higher follower counts was unfairly privileged by algorithms:

> So once you do get going, you just keep going. I've seen that with some of the accounts I follow. It's like, they have 100 [followers], they have 600, they have 1000. Next thing they know they have ten thousand, one-hundred thousand. How did it exponentially grow like that? And I think that has a lot to do with the algorithm. (personal communication, July 2018)

He also expressed frustration that there were creators who used unsubstantiated clickbait to get engagement and, thus, perform better with the algorithm, arguing that there was an "honest" way to get noticed and a dishonest one. Ultimately, he expressed his frustration with people who he felt were gaming the algorithm because the algorithm "chooses what content you find," in other words, what content gets noticed (personal communication, July 2018). Similarly, Andrea said, "As someone who's not a top creator, I definitely feel like the algorithm works against me" (personal communication, August 2018). In other words, both Sam and Andrea felt that the more followers an account had, the more their content was likely to be algorithmically boosted—in a kind of "the rich only get richer" economy with content as capital. Although none of them spoke of any instances where they felt they had experienced explicit algorithmic discrimination based on race, gender, or sexual orientation, most of my participants felt that, at times, their content was treated unfairly by the algorithm(s) of the platform they were working with because of their status as young, but growing, creators. Overall, they were often uncertain about what exactly had downgraded unsuccessful content—and expressed frustration; some even made the assumption that other creators (who were more successful) were so because the algorithm had unfairly privileged their content.

Interestingly, even though Cara described herself as often being frustrated by the uncertainty of being able to tell what made content successful or unsuccessful, she expressed that she believed that Instagram's algorithm was doing its job by showing her content to the people that wanted to see it. In other words, she believed that the algorithm accurately knew the minds of the people who might want to see her content and showed it to them: "It's trying to put my content in front of people when they want to see it, to people who are already interested in seeing it" (personal communication, July 2018). However, believing in the infallibility of algorithms to show us what we want or even need is problematic at best and harmful at worst. Such beliefs point to a greater need for an algorithmic literacy that would help users be more critical of the experiences they have on social media platforms. Algorithms are presented as "[attempting] to produce representations of the wants or concerns of the public, and as such, run into the classic problem of political representation: who claims to know the mind of the public, and how do they claim to know it?" (Gillespie, 2012).

Overall, my participants' constant frustrations with the opacity of the complex system through which they were trying to choreograph success put uncertainty at the center of their experiences. They often perceived a mismatch between what they felt was good content and what their audiences—both algorithmic (and maybe human, too)—perceived as good content. Furthermore, they referenced frequent experiences as being uncertain about why content was downgraded or why it was upgraded. Some described this as a love/hate relationships: When their content was upgraded, they were pleased; when their content was downgraded, they were frustrated—and sometimes even felt they had been treated unfairly by the algorithm, which they felt privileged other creators who were more successful or which privileged content that was disingenuous clickbait.

Such frustrations and uncertainty with algorithms' opacity sometimes gave creators a sense of disjointed reality, where their ideas of good content did not line up with their content's performance; in moments of feeling the discomfort of such disjunctures, we would do well not to forget: Those who market algorithms say that algorithms are capable of knowing what we want. Cara's belief in an algorithm's ability to know what people want to see is precisely the story that edge providers like Facebook, Instagram, Twitter, and YouTube tell about their platform's algorithms: that they are showing the right content to the right people at the right time, based on feedback from users. Even so, participants in this study possessed a valuable ability: The ability to process frustration and uncertainty productively in the face of algorithmic opacity helped them be willing to continue creating content.

Conclusion

Being aware of algorithmic circulation requires that practitioners think about the success of their content in ways that force them to be tactical (Edwards, 2017), pay attention to algorithmic audiences (Gallagher, 2017); imagine intertwined algorithm and human agency in success of content, and navigate uncertainty with grit and determination. In other words, when we teach students how to be mindful of algorithmic circulation for their content, we must teach students how to:

- Apply tactical techniques: Writers and creators who plan for algorithmic circulation must use a *tactical rhetorics* (Edwards, 2017) approach to experimenting with, navigating, adapting, and reconfiguring their content strategies on the fly. Such a tactical approach encourages not only a futurity mindset that focuses on predicting success, but also on close observation of past successes and close monitoring of content performance, particularly when it is newly released. Tools and methods for such observation might be varied, but platform analytics and qualitative analysis may present useful opportunities for such monitoring.
- Pay attention to algorithmic audiences: In order to circulate their content successfully, writers and creators must imagine the needs of algorithmic audiences; a three-part framework identifies areas to which creators must pay attention, including: Imagining the values of those who program algorithms; being aware of the kinds of data, metadata, and feedback that algorithms use to make decisions about ranking content; and anticipating audiences (Gallagher, 2017). Algorithms function in often invisible ways to many users; however, the creators in this study displayed a keen skill for observing the reactions of algorithmic audiences and dexterity in navigating those reactions to achieve success.
- Understand success through joint human and algorithmic agency: In addition to attending to the needs of algorithmic audiences, writers and creators must understand that the success of their content hinges upon joint algorithmic and human agency. While this agency is complex and intertwined, creators who plan for algorithmic circulation would do well to attend to both the needs of their human and nonhuman audiences, as they influence each other in cyclical patterns of agency. In algorithmic formulas, human engagement is often a factor that is weighted in the success of content; thus, sometimes appealing to algorithms often also means appealing to humans to improve the circulation of content. The creators in this study were largely aware that human engagement and subsequent algorithmic boosting were processes that were closely correlated and perhaps even indistinguishable from each other in many cases.
- Navigate uncertainty: The creators in this study were often frustrated by the opacity of algorithms. Overall, they often had mixed feelings that resulted from the uncertain elements of navigating algorithmic optimization in the face of such opacity. Although analytics and individuals' observations and insights may help creators better understand algorithmic activity, students must be prepared to encounter feelings of uncertainty, as well as deal with the ups and downs of content that performs successfully—or unsuccessfully.

To practice algorithmic circulation, students must first become more critically aware of their activities within algorithmically mediated spaces. It is very possible for users to participate in and create content without giving attention to (or even being aware of) algorithms and the practice of algorithmic optimization. In addition to undertaking pedagogical recommendations to pay attention to algorithmic audiences (Gallagher, 2017), students can also benefit from understanding the history of the mathematical and political modeling of social relevance, in which Larry Page's Google PageRank algorithm and Serkan Piantino's Facebook EdgeRank algorithm can become illustrative examples. The implicit value systems behind claims of social relevance are composed of valuations and assessments of what kind of content or experience—or even which content producers and whose content experiences—might then be considered irrelevant. In other words, we must teach students to interrogate whose values are reflected in definitions of relevant content, relevant audiences, and the accompanying ways those categorizations might become problematic or pose new challenges for audience segmentation practices and the content creators who use segmentation tools.

This study has offered preliminary data on content creators' everyday experiences with algorithms. With the proliferation of social relevance algorithms and increasing ubiquity of algorithmically mediated online spaces, content creators today must succeed in an economy of relevance. As many content creators know quite well, the complex decision on the part of edge providers of what content to algorithmically show a user "requires 'thousands of metrics,' containing many moving parts, and is changed routinely (almost every week)" (Tufekci, 2015, p. 206–207). Given this dynamic environment for modeling social relevance, future research should continue to investigate practitioners' day-to-day experiences with content creation in algorithmically mediated spaces. Because emerging technologies often make way for new manifestations of old oppressions, more work is also needed to explore the everyday experiences of users already marginalized offline in algorithmically mediated spaces (Noble, 2012, 2018). Furthermore, we should continue to investigate how algorithms are redefining paradigms for important ideas in the field; for instance, here, I have discussed algorithmic perspectives on circulation; as frequently mentioned, Gallagher (2017) has re-envisioned the idea of audience in algorithmically mediated spaces; and many have revisited the idea of agency in respect to algorithms. We might also reasonably ask how algorithms are changing paradigms for ideas like access and literacy, considering how a changing digital landscape is being in part shaped by mathematical models of social relevance.

Declaration of interests

None.

Angela Glotfelter is a PhD student at Miami University of Ohio, where she studies algorithms and content strategy. Her research interests broadly include intersections of emerging technology and human agency. She is currently researching algorithmic bias and Google's depiction of its own marketing algorithms in its Google Ads Search Certification courses.

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