Research Article

Shawn Graham*, Damien Huffer, Jaime Simons

When TikTok Discovered the Human Remains Trade: A Case Study

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Abstract: In the summer of 2021, a video on TikTok was heavily reposted across a variety of social media platforms (attracting conventional media attention too). Unusually (for TikTok), it was about the trade in human remains. Thus, we were presented with the opportunity to watch how knowledge of the trade exploded into broader public consciousness on a comparatively newer platform. In this article, we scrape TikTok for reactions to that moment. In our previous research on the human remains trade on Instagram, we used a particular suite of digital humanities methods to understand how Instagram was being used by participants in the trade. Here, we employ those same methods to develop a case study for contrast. The original individual, whose TikTok account is used to promote his bricks-and-mortar business buying and selling human remains, has, as a result of this attention, gained an even greater number of followers and views, making the video a “success.” Nevertheless, several users engaged in long discussions in the comments concerning the ethics of what this individual is doing. A number of users created videos to criticize his activities, discussing the moral, ethical, and legal issues surrounding the trade in human remains, which in many ways makes the “success” of this video one of fostering opposition and a wider understanding of the ethical and moral issues around this trade.

Keywords: human remains, social media, network analysis, computer vision

1 Introduction

Archeologists have long been interested in understanding the scale and scope of the trade in antiquities (e.g., Brodie, Kersel, Luke, & Tubb, 2006; Campbell, 2013; Paul, 2018). The trade in human remains can be seen as a subset of the larger antiquities market, but it also intersects with the history of archeology and anthropology in that many of the remains currently being traded were first obtained from peoples living at the end of the 19th century and well into the early 20th century (and longer, in some areas), for the “scientific” study of human variability and for the teaching of anatomy. Now often referred to euphemistically as “medical antiques” or “medical specimens,” these remains were bought and sold primarily through antique stores and osteological supply companies and collected by niche collectors. With the emergence of online commerce, and especially the creation of algorithms that watch, measure, and act upon browsing behavior, the landscape of this trade has changed substantially.

The human remains trade, conducted over social media and e-commerce websites (as well as via traditional “bricks and mortar” storefronts), has been growing in scale and scope over the last decade or
so (Graham & Huffer, 2020; Huffer & Graham, 2017, 2018), occasionally spilling into public consciousness (Carney, 2007; Schwartz, 2019). Via our “Bone Trade Project” (funded by the Social Sciences and Humanities Research Council of Canada), we have been documenting how this market operates on select platforms as case studies of a multiplatform phenomenon since 2017. Our work initially focused on Instagram (to which a lot of traders moved their activities after the eBay ban of 2016, Graham, Huffer, & Blackadar, 2020; Graham, Lane, Huffer, & Angourakis, 2020; Huffer & Graham, 2017, 2018), but we have also looked to some extent on Facebook, the Dutch-language e-commerce platform Marktplaats.nl (Huffer, Graham, Brughmans, & Simons, in press), and early search-engine surveys of human remains offered for sale by brick-and-mortar stores and/or online business pages accessible via common search engines, before trafficking via social media became prominent (Huffer & Chappell, 2014). Private or closed groups on Facebook are a known locus of traders, but have not been part of our research to date. This research has actively contributed to fuelling academic and public interest in the “end stage” of this market, but it rests within the context of other researching investigating remains seized from the market using methods common to osteology, forensic anthropology, forensic taphonomy, and various categories of archeological science (Gill, Rainwater, & Adams, 2009; Houlton & Wilkinson, 2016; Huffer, Guerreiro, & Graham, 2021; Watkins et al., 2017; Winburn, Schoff, & Warren, 2016).

Our research project has had a focus on Instagram as a locus for fomenting taste and consumption and marketing of human remains, scraping tens of thousands of images and associate metadata. We have used text mining on the text of the posts, image classification methods on the photographs themselves, methods drawn from the digital humanities, machine learning, and computer vision fields. This work has revealed that the majority of posting or discussion regarding human remains is to drum up enthusiasm for the practice, encourage new collectors, or show off and further a display aesthetic that mimics Victorian-era “wunderkammer” and museum displays (see our full project bibliography at https://bonetrade.github.io). At the same time, Instagram is also a primary site of actual commerce, even if most individuals now choose to negotiate prices in private (rather than posting prices and negotiating in the comments), as is increasingly common on other social media platforms and for most forms of trafficking (Al-Azm & Paul, 2018, 2019).

We have also quantitatively assessed the number of active sellers, their following–follower networks, and total available prices per year twice (Graham & Huffer, 2020; Huffer & Graham, 2017), demonstrating that total listed prices continue to increase (and in reality are a fraction of the actual amount of money transacted over this platform) as well as the number of posts, even as the number of public accounts involved in or wholly dedicated to the human remains trade has declined. Whether this is due to more individuals choosing to switch from public to private or that real numbers of participating individuals declined due to the onset of the worldwide COVID-19 pandemic in 2020 cannot be determined. Compared to more established social media and e-commerce platforms, however, the movement of the human remains trade onto TikTok has opened a significant new avenue of research, enabling us to see how traders exploit a new platform’s intrinsic affordances.

TikTok, also known as Douyin (抖音), is owned by the Chinese company ByteDance and was first launched to the Chinese consumer market in 2016 and for international iOS and Android users in 2017. It later merged with the Chinese social media platform Musical.ly and launched in its current form internationally on August 2, 2018 (Smith, 2021). Between 2016 and 2020, over 2 billion users actively used the app (Top 20 TikTok Statistics: Key Facts, Figures, & Data, (2019 [2020])). Nearly half of its user base is from the 16 to 24 age group; 90% of these users claim to use it daily (Beer, 2019; Dean, 2020); i.e., roughly 600,000,000 people. TikTok is known for “fun” or “goofy” uses both imitative and adaptive, like lip-syncing to popular music, copying, sharing, or subverting dance styles, mixing music into new forms, etc. What makes those videos possible are the many unique creator features of TikTok such as the ability to post videos with preselected or self-made soundtracks and backgrounds, tag other users, and importantly for purposes of extending one’s reach, the ability to “stitch” with other user’s content. A “stitched” video reuses a certain amount of someone else’s video allowing the second creator to respond to, or expand upon, the first person’s video; such videos carry the #stitch hashtag and name the user whose materials have been reused. “Duetting” is another means by which media is shared, with the newest means of sharing being to
“repost” from one’s FYP or “for you page,” a page that TikTok puts together automatically to showcase videos that the TikTok recommendation algorithm calculates will draw your attention.

The means by which content is created and shared allows for videos and users to more easily “go viral.” The definition of this term in social media research is not exact, with some scholars and marketers placing more importance on a piece of media receiving more than the threshold of 100,000 views, while others maintain all that matters is the rate at which the media is viewed over a short period of time (Nahon & Hemsley, 2013; Vertical Rail Staff, 2016; Wadbring & Ódmark, 2016). The longer a viewer spends watching a video, the more that TikTok learns that this video is “interesting” and so the more likely the video will be served up automatically to other users with similar attention profiles (the precise mechanics of TikTok’s attention algorithms are of course a secret, but massive experiments conducted by the Wall Street Journal in 2021 using hundreds of fake accounts seems to support this understanding of how the algorithm works). While many users have attracted well-deserved attention due to the creative, humorous, or socially conscientious nature of their content, the platform has also attracted numerous studies and media exposés detailing how illicit or exploitative content has found a home as well (e.g., Little & Richards, 2021; Weimann & Masri, 2020; WSJ Staff, 2021). While there is not an in-built payment option included with account creation, as with, for instance, Facebook and Instagram, payment for goods and services can be negotiated in messaging or via movement to PayPal, TransferWise, and related international payment services (however, TikTok announced on September 28, 2021, that it was rolling out “TikTok Shopping” to more users, an e-commerce feature that will allow “business” accounts to commercialize their accounts, Perez, 2021).

It should thus come as no surprise that prominent members of at least some trafficking communities have taken to the platform to reach new audiences or indicate that sales can be arranged via their account on other platforms, such as Instagram. In the case of the account we discuss later, we see an example of a relatively minor player within the larger global collecting community suddenly rising to much greater prominence through savvy use of several of the platform’s built features while simultaneously being able to capitalize on advertising revenue due to increased video viewship or media coverage. Research in human–computer interaction about what makes a video “persuasive” suggests that a combination of humor (of a particular kind, usually juvenile or slapstick) and shot-composition (videos shot with one or more speakers directly facing the camera) can have an impact in terms of persuasiveness because of a sense of immersiveness and presence that the video creates with its “star” (Wang, 2020); combining this with the personalization and the way TikTok automatically suggests and plays videos in a user’s feed, a video does not necessarily need to reach a mass audience (“go viral,” as it were) for it to have an impact (Weimann & Masri, 2020, p. 10).

The account we discuss later, which we’ll call “Individual 1,” was created in February 2020 and first rose to prominence outside TikTok on August 10, 2021, when the user posted a video displaying 100+ articulated vertebral columns adorning his apartment’s closet clothing racks. He called this collection his “pride and joy”. We transcribe the video here:

Post: Reply to @....Hey everyone nice to meet you! Feel free to ask any questions you might have any comments I’ll take the time to answer it!

[00.00 shot 1. Facing the camera, 5 ranks of shelves behind, with approximately 26 skulls displayed, two of which are clearly infants; speech bubble with comment: I. why do you have so many bones. HOW DO YOU HAVE SO MANY BONES?!??]

*Hello, my name is....*

[00.02 shot 2. Cat on the floor in front of display cases with several skulls; one has a handwritten label across the forehead; speech bubble remains]

This is my cat.

[00.04 shot 3. facing the camera, new location. Open shelves above display cabinets in the background, several crania displayed. Speech bubble remains]

I study osteology primarily specializing in the medical bone trade.

[00.07 shot 4. camera pans across the room from three articulated skeletons in the corner, across the skull display to the other corner where another three articulated skeletons hang from a clothes rack. Speech bubble remains]


and this is how and why I work with osteology for a living.

[00.11 shot 5. new scene; appears to be a small room/closet. The camera pans right to left around the room showing two rows of articulated human spines hanging from hooks; approximately 100 individual spines displayed. Speech bubble remains]  
My pride and joy is my human spine collection.

[00.15 shot 6 is in the same location, stance as shot 3. camera steady, addresses the camera with emphatic hand movements]  
And in the US, there is no federal regulation against the ownership, sale, or possession of human osteology so it’s completely legal [broad smile]  
[00.20 shot 7 is the same as shot 2; now petting the cat. Speech bubble remains]  
I’m making this video to help answer any of the questions you might have.
[end]

The video was reposted across social networks as other people encountered it (or were “tagged” into its comment chain, see below); conventional news outlets then picked up the “story.” We first encountered the video via our own Twitter accounts. Before August 2021, we do not know how many followers Individual 1 had on TikTok. They have posted prolifically since 2019, with the earliest posts documenting “day-in-the-life” of a student, shifting slowly toward mostly bone-related content as they started up their business. They have had a Twitter (business) account since May 2019, but as of February 2022, this account is following nine other accounts and is followed by 27. The free service “Carbon Dating The Web” (http://www.carbondate.cs.odu.edu; offered by the Computer Science department, Old Dominion University) suggests that Individual 1’s business website was created in January 2021. Their YouTube channel dates to February 9, 2020. As of February 2022, only a few videos are viewable, the most viewed of which dates to August 31, 2020, and has 13,460 views. The rest have views in the hundreds to low thousands, and this most viewed video itself has only 345 likes. Their personal/business Instagram account was created on November 27, 2018, and currently has 1,246 posts and 45,100 followers (thus, we had encountered his web store front before in the course of our research and were aware of him). The centrality of TikTok to Individual 1’s business is shown by its number of followers: currently at 513,400, with 22.5 million “likes”; prominently displayed in the bio is a call to “Learn more on our website!”

Frequently across his videos, Individual 1 will state that “all this is legal!.” The question of the legality of the trade in human remains is far more complex than is regularly repeated; a frequently stated “truth” is that it is only legal in Louisiana, Tennessee, and Georgia. In point of fact, several states have laws and ordinances that would prohibit the trade if they were enforced. Marsh (2015) collected the relevant US laws related to all aspects of dealing with the dead. Some laws are framed in terms of public health, others in terms of funeral home regulation, others in terms of organ donation or the transportation of tissue, and some are framed in terms of archeology and cultural resource management. Individual 1 has been clear across platforms that his residence and business is located in and ships from New York City. The relevant laws in New York state are found under the Public Health ordinance and make it an offense to “receive” a human body or any part thereof with intent to sell, New York Public Health (2012) (PBH) CHAPTER 45, ARTICLE 42, TITLE 2, Section 4216 and 4217. Individual 1 has also claimed a measure of osteological expertise (even hosting a separate series of videos on his TikTok account under the heading “Bone Facts,” and separate “Education” and “Literature” sections on his website). His educational background (as detailed in his videos and on his website and in his media appearances) comes from the world of design. He has claimed to employ an osteologist or forensic anthropologist who assesses anything sold to him. He frames his work as a “service” that “respects” the bones and afford them places to live on after being “abandoned” by their owners. The danger here is that his message celebrating owning, buying, and selling human remains, along with his reassurances on the legality, given the manipulability of social media, can reach an impressionable audience without pushback or criticism.

Individual 1’s successful use of TikTok to achieve a place of relative prominence on TikTok, and his associated videos enable us to explore the reaction to this class of archeological materials meeting for the first time a broader public unprepared. How do people on TikTok engage with the ethical and moral issues around
the trade in human remains? Given the affordances of TikTok, what sets this reaction apart from other social media platforms? What lessons might be drawn for archeologists who wish to engage with such a public?

2 Ethical Considerations in Archeological Social Media Research

Social media research and its intersection with archeology sometimes can blur the objects of our study. It is important to acknowledge here that many archeologists cultivate personal social media presences across multiple platforms for purposes of educational outreach (and, as we’ll see below, to push back against Individual 1’s rhetoric). Many of these archeologists are student researchers themselves, or scholars who freely give their time and labor to provide ethically informed content on a variety of topics. Thus, their work also gets collected when we do our surveys of social media related to the human remains trade.

As archeologists, we have a “shared responsibility to push the discipline of archaeology forward into a more equitable, ethical practice,” especially in the area of digital archeology (Richardson, 2019). We say “especially,” since the online world, social media, and how archeological consciousness can be shaped there, falls into digital archeology’s bailiwick. This is where “archeology” plays out for many of our interested public. The aspirational ethical codes and prescriptive mandated ethical frameworks that govern professional archeological practice have been outpaced by digital technologies and their usages (Dennis, 2021). As per Dennis (2020), digital tools and methodologies “should be subject to the same level of ethical scrutiny as any standard or traditional piece of [archaeological] kit or methodological approach.”

The emergence of automated data collection techniques and their use on digital media platforms can offer a useful look into social networks present on the platforms and the way that users react to emergent media, giving us a sense of how “lay” people understand the issues around human remains, or other kinds of materials that might be considered “portable antiquities” (and of course, our colleagues’ interactions in these spaces as well). However, this emergence necessitates “urgent and deeper critical thinking around what such data reveal or conceal, and what we, as archaeologists, expect from our social research” (Richardson, 2018). Research around data gathered from digital media platforms are frequently presented “without the inclusion of any ethical statements on how the data was gathered or what permissions were gained to use this material” (Richardson, 2018). As per Boyd and Crawford, “it is problematic for researchers to justify their actions as ethical simply because the data are accessible... The process of evaluating the research ethics cannot be ignored simply because the data are seemingly public” (Boyd & Crawford, 2012, p. 672).

The collection of observational data such as TikTok tags, comments, and interactions, raises important ethical questions about privacy, especially as it pertains to protection from abuse and harassment. Human remains exist in a legal gray area in many jurisdictions, while in others, the ownership or transportation of human remains are covered by a panoply of laws, statutes, and regulations that are not necessarily enforced (unless the attention of authorities is drawn to a particular instance). As researchers, “[w]e have an ethical obligation to ensure that participation in our digital projects does not provide an avenue for personal harassment,” especially in “contexts where non-mainstream opinions are elicited, politically relevant archaeological sites are discussed, or controversial subjects are presented for public consumption” (Richardson, 2018). Because we cannot know the legal situation for every user whose materials might get collected through automated techniques, we cannot therefore put individuals at risk since we cannot know what all the risks might be for an individual.

Every effort has been made to be cognizant of these ethical issues. Our general research project is designed to comply with SSHRC ethics guidelines (Tri-Council Policy Statement, 2018) regarding its ethical approach to collecting and working with social media materials, having been evaluated by the Carleton University Research Ethics Board. In short, we no longer share datasets of social media posts; our early research did, after a process of anonymization, but we now recognize that it is impossible to fully anonymize such materials. While the original source material is posted openly online with the expectation of others’ reading and acting upon it – making a sale; convincing someone that it is “fun” and legal to collect human remains; convincing someone of the opposite – that is not the same thing as expecting such
materials to be collected for study. Accordingly, we only make the network metadata derived from users’ posts available from this present study, with no identifiers.

Should we name “Individual 1”? This user certainly would seem to have waived any expectation of privacy, given how they employ their account to self-promote and to promote their business. The existence of this account and the episode of the “spine wall” video were discussed across a wide variety of media venues (we also discussed it in an op-ed we wrote for the arts magazine, Hyperallergic (Graham and Huffer 2021); we did not name the user or the account there). It is trivial for someone to discover this individual and the account. Naming the account might be acceptable, in this case, especially as the name of the account became a hashtag that others used to categorize their reactions and their own contributions (see below). We do not wish to validate or otherwise provide oxygen to this user’s practices; if we named him here, despite our opprobrium, our paper would serve to enhance his business (our research sometimes makes its way into magazines and newspapers, which invariably seek out bone traders for “balance,” and so serve to drive more traffic to the trader, e.g., Graham, 2019; Schwartz, 2019). In which case, we will refer to the account like so: **********.

We will not identify other accounts we discuss, not even by username, nor will we make the post metadata files that we have scraped available. The only metadata we will share will be anonymized network datasets derived from the use of hashtags to demonstrate patterns of interaction around this one particular username and associated videos.

3 Method

We used Andrew Nord’s tiktok-scraper (Nord, 2020) (https://github.com/drawrowfly/tiktok-scraper) to download videos and associated metadata from TikTok according to two hashtags: #bonetok and #**********. The first is a general tag used by TikTokers interested in both human and vertebrate osteology, while the second is a hashtag that replicates the username of Individual 1 whose videos came to general attention in August 2021 and is being used by TikTokers who are commenting on the human remains trade in particular. For the text analysis of the comment threads on the initial post by Individual 1, we used the Chrome browser plugin “Scraper” by “dvhtn” version 1.7 combined with manually paging through the comments.

TikTok is famous for its seeming ability to quickly learn what a user is most interested in; the precise mechanisms are unknown (being a closely guarded trade secret), but an investigation by the Wall Street Journal (2021) using automated “sock-puppet” accounts found that the single biggest influence appears to be the amount of time viewing a given video. In this study, we are merely observing, not participating in TikTok (since we do not want TikTok itself to start responding to our interest in human remains at the present moment). What we see is in some ways similar to what a new user coming to the platform might encounter, if they clicked on the “#bonetok” or “#**********” hashtags. Our analysis therefore is limited to people who make TikTok videos, rather than the wider universe of potential TikTok consumers. We also preliminarily conduct topic modeling on the approximately 2,000 top-level comments left on Individual 1’s post (out of a total of approximately 37,000 comments. The remaining 35,000 comments are nested replies to individual comments, sometimes making subthreads). Topic models are a way of identifying statistical patterns in word use that can be inferred to represent “discourses” present in a large body of text. A sample of the comments within two especially active threads related to the ethics and legality of the human remains trade prompted by Individual 1’s videos is also considered.

Once we have obtained the videos and metadata, we can look at the network of creators who explicitly tag their videos as a response to another user using the @ symbol. We can also create a network of videos to hashtags and then transform this network so that hashtags are connected to other hashtags by virtue of appearing on the same video. The resulting network can be thought of as surfacing the connected concepts that users employ to conceptualize the communities they are engaging with. It is a network map of “ideas” that surround the initial post. This map can then be queried for structural patterns like grouping or clustering (formally, “modularity,” or the idea that nodes that have similar patterns of interconnectivity
among themselves form a community) or high connectivity (“betweenness centrality,” or the idea that a node is important because it sits on the highest number of shortest paths between all pairs of nodes) that can be used to infer patterns of discourse. Hashtags that belong to the same clusters suggest a general topic or “idea,” while hashtags with a high betweenness centrality could be understood as ideas that broker pathways to other discourses, “gateways” as it were. It is important to understand that what we are generating, by looking at patterns of hashtags, is not how users find videos on TikTok, or a divination of how the algorithm uses hashtags for its recommendations. When users give a hashtag to their video, it is a way of signaling how they understand its broader content or perhaps conversations in which the video takes part. Thus, if we build a network from these data, we are obtaining an emergent, higher-level view of these conversations.

Then, we consider patterns of similarity in the composition of the videos. We do this by extracting “key frames” from each video. These images are then fed into a pretrained convolutional neural network that would be normally used to automatically caption images; the output of the second last layer of this neural network transforms the image into a 2,048-dimension description of the image’s features (i.e., it creates a vectorized representation of how the network responds to the image). Each output, or vector, can be measured for its similarity to every other vector, and the results projected into a two-dimensional space. We use the PixPlot python package from the Yale DH lab (2021), which uses as its trained neural network, the Google Inception V3 network. The result is a visualization of visual similarity of the different key frames. We can then find clusters of similarity and explore by eye what they imply for how TikTok creators are making these videos connected with the human remains trade.

4 Results and Discussion

Figures 1 and 4 present a sense of the spike in use around the hashtags that we used to focus our scrape of metadata from TikTok. Figures 2, 3, 5, and 6 represent network data derived from scrapes of TikTok pulling...
in metadata from just over 300 unique accounts posting 607 videos and 1,057 unique tags. The metadata includes information on whether a post is an explicit reply or “stitch” with someone else’s post, the source of music, whether any special effects are used, and any hashtags included in the body of the text. For our study, we explored the co-occurrence of tags and the explicit mentions of other users. Figure 5 presents an experiment in considering the visual similarity of these posts, in the context of the larger discourses as suggested by the networks.

**Figure 2:** A visualization of the network of hashtags connected to other hashtags by virtue of appearing in the same post, colored by modularity (communities of similar interlinkages). The visualization is not particularly useful, other than to demonstrate that clusters of hashtags do differentiate structurally in their use.

**Figure 3:** Network of explicit mentions in posts from that single day, all of which used the “bonetok” tag. Color is according to modularity. The user may consult the original data file “bonetok-user-network.”
We scraped TikTok for videos on August 23, 2021. Retrieved posts dated from August 27, 2020, to August 24, 2021 (capturing some posts made by users on the other side of the world from us, clearly), with an increased use of the tag beginning in April 2021. We cannot know how representative these data are (in part...
because TikTok’s inner workings are opaque and we are relying on what can be scraped from the individual posts we find, via TikTok’s public-facing search; however, given how once a user becomes aware of a tag (and how TikTok learns that the user is interested in that tag), we will assume that these materials are representative of what a user might view once they’ve encountered this interest. We must also acknowledge that at least some commentators might be reacting to Individual 1’s content purely due to it containing human remains, or due to how those remains are used, talked about, or framed. They might therefore be fed Individual 1’s content due to previously viewing related videos.

The trawl surfaced 205 unique users across 419 posts; on these posts, there were 789 unique tags. (Figure 1 depicts the use of this tag over time in the posts recovered.) We extracted a list of usernames and the associated hashtags they employed in their posts; we further transformed this list so that each row had one username and one tag. Since “#bonetok” appears in every post, we then removed those rows containing “bonetok” from this “edgelist” where users are connected to their tags. By using the Gephi social network analysis and visualization program, we then transformed this network so that the nodes are the actual tags, connected by virtue of being used by the same user.

Thus, if person A used the tag #oddities and the tag #vultureculture, those two nodes would appear connected with a weight of one. If person B also used the same tags in a post, but also used the tag #skull, the connection between #oddities and #vultureculture would now have a weight of two, and there would be two new connections made from #oddities and #vultureculture to #skull, and each of those new edges would have a weight of one. (Formally, we have transformed a two-mode network of users to tags into a one-mode network of tags to tags where the edges or links represent the number of users using those tags).

The resulting network that we analyze has 789 nodes (the hashtags) connected by their co-occurrence in a post (thus, 14,043 paired relationships). The resulting network gives us a representation of the ideas or discourse surrounding “#bonetok.” (The reader may consult the file bonetok-hashtags-network.csv.)¹ There are a variety of network metrics one could then derive from these data; “betweenness centrality” is a

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measure of a node’s placement globally with regard to every other node where we count the number of shortest paths connecting every pair of nodes; in this case, ideas or hashtags that sit on the greatest number of all shortest paths are the nodes most “in between” and thus give us an idea of central ideas around which TikTokers organize and promote their posts. Figure 2 shows this network.

Unsurprisingly, the node with the highest centrality was “bones.” The top 20 hashtags are listed in Table 1. The variations on “for you page” (fyp, fy, for you) are all attempts to get one’s video onto the coveted first page on TikTok that a user sees, whether deliberately to drive more traffic to their own content, or tangentially due to content creators wishing to share something they find important or amusing, whether new viewers of the particular video go on to follow their account. “Vultureculture” is a hashtag that we encounter on other social media platforms and covers not only human remains but also taxidermy and various subcultures devoted to animals. “Witchtok” is interesting in that it gives us an intersection into another very active TikTok subculture that is also known to acquire, use, and debate the use of, bones within their community of practice. Some hashtags, like “stitch” or “greenscreen,” are related to the affordances of TikTok and how the particular video was made. “Bonetokhelpme” is interesting in that it points to perhaps some of the earlier uses of the bonetok tag, for identifying animal bones encountered while walking and so on.

We can explore how the links between different nodes imply “communities” or “clusters” of ideas that when read in concert provide some further illumination on the discourse surrounding bones. In Gephi, this is called “modularity,” and Gephi’s modularity routine identifies clusters of nodes that interlink strongly among themselves and weakly with the rest of the network.

The routine found that there were 28 separate modules (it numbers them 0–27, and the label does not imply anything about size or structural importance). Table 2 lists the six largest modules, which altogether account for 86% of the materials; the remaining modules have nodes in them that are poorly or not otherwise connected to the main network (remember, the original hashtag we scraped has been removed from this analysis and would otherwise have connected every module together). Within these modules, we can look at the most important hashtags via the already computed betweenness metric again.

What does this tell us? Modules 3 and 2 seem to be a kind of “meta” level of tag use where the user is trying to game the system to achieve virality, with module 2 and 12 also having a more “promotional” feel supporting business that might not be necessarily involved in the human remains trade. Module 0 veers

| Table 1: Top hashtags by betweenness centrality, in the network of hashtags to hashtags by virtue of appearing in the same post, from a scrape of Tiktok using “bonetok” as the search term. After the scrape, “bonetok” was removed from the analysis

<table>
<thead>
<tr>
<th>Bones</th>
<th>Fyp</th>
<th>Vultureculture</th>
<th>Witchtok</th>
<th>Skull</th>
<th>Skulls</th>
<th>Foryou</th>
<th>Bone</th>
<th>Foryoupage</th>
<th>Oddities</th>
<th>Stitch</th>
<th>Viral</th>
<th>Taxidermy</th>
<th>Art</th>
<th>Bonecollector</th>
<th>Skeleton</th>
<th>Witch</th>
<th>Bonetokhelpme</th>
<th>Osteology</th>
<th>Greenscreen</th>
</tr>
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Table 2: Top tags by betweenness centrality, within “modules” or “communities” of similar network structures, from a scrape of Tiktok using “bonetok” as the search term. After the scrape, “bonetok” was removed from the analysis

| Module 3 | 44% | bones, fyp, vultureculture, witchtok, skull, foryou, foryoupage, oddities, stitch, skeleton, bonetokhelpme, nature, bonejewelry, oddity, collection, crystaltok, witchtok, teeth, humanskull, boneart, skullart, pagan,witchyvibes, crafttok, bonetoktiktok, goblitncore |
| Module 2 | 18% | skulls, bone, viral, taxidermy, art, witch, flowers, witchcraft, artist, pheasant, dogsoftiktok, deer, halloween, commission, pink, feathers, haunted, bonesinabucket, cleanup |
| Module 12 | 10% | creepytok, skulltok, witchy, spiritual, spiritualtiktok, creepygirl, crystals, deerskull, creepy, witchythings, etsyshop, smallbusiness, creepycool, deadtok, artistsoftiktok, specimen, crystal |
| Module 0 | 6% | osteology, anatomy, skulltiktok, bigone, horrortok, deathpositive, biology (but also includes: skullcollector, wunderkammer, skullcollection, oditiktok, skullcleaning, tattoo, cazaska, osteologist, cemetery) |
| Module 14 | 4% | bonecollector, storytime, anthropology, humanremains, duet, respect, athropologytiktok, archaeology |
| Module 19 | 4% | greenscreen, spooky, museum, voiceeffects,goth (but also includes truecrime, ghosts, neworeleans [sic], deadbody, truecrimetiktok, cemeteriesoftiktok) |

more into the display of human remains, while module 14 seems to circle around pushback and discourse over the morality/ethics of collecting. Module 19 gets into the “showy” aspect of human remains as a kind of decoration.

The “stitch” tag points to a TikTok feature enabling one to remix someone else’s video with your own; seeing it as a tag is both an encouragement to remix and a signal that a piece has been remixed. Such posts are also signaled in the original metadata in a field called “mentions.” Note that “mentions” are a distinct piece of metadata and that these mention networks are a subset of the total number of unique users whose material we scraped. We can create a network from our “#bonetok” scrape where only the nodes that explicitly mention other nodes are represented – these are “call outs,” “shout outs,” direct challenges or responses meant to be seen. This network is depicted in Figure 3.

Figure 3 shows one account in particular at the center of this network: Individual 1. The network depicted is the largest connected component; other pairs exist (user A “stitching” with the work of user B or calling them out explicitly), but the entire “graph” as a whole remains fragmented. The connections here are also directed: if account A mentions account B, we will have a video made by account A (but not a video made by account B); thus, there is an arrow on the edge A–B pointing at B, but not at A.

Upon inspection, we find that the green nodes are all professional archeologists or archeology students responding to Individual 1 directly via a particular video (and sometimes, each other). Note that Individual 1 does not respond back. In fact, the only person Individual 1 responds to more than once is when Individual 1 created multiple “stitch” videos featuring the “stitched” person in the source video who asks, “What is the rarest thing in your collection”? Individual 1 then shows off many parts of his collection, including his infamous “spine wall,” over several videos, with the same clip from the source video as introduction each time. Other responses he makes are to demonstrate his alleged knowledge of osteology, responding to videos that ask questions like, “What is this thing” (pointing to the philtrum, the area of the skin underneath the nose on the upper lip).

In the diagram, the three red nodes are mentions of users by the same person who patiently explains the problems with owning human remains (the post pointing to Individual 1) but then has to respond to other TikTokers attacking her views (the other posts), which seems to also point to the way these responses (in the network as a whole) might vary according to the perceived gender of the original poster.

In this network of mentions, there are no posts supporting Individual 1; rather, they separate out into subclusters by the presence/absence of secondary conversations over the morality and ethics of bone collecting.

The blue node connected to Individual 1 at the center of the diagram is responding to Individual 1 directly. The associated post shows a screenshot of comments on another post, where Individual 1 suggests that this user (blue node) is “just making things up” – i.e., their statement that Individual 1 does not treat human remains with respect. There follows a montage of several videos from the ********** account where
Individual 1 is clearly treating bones with a distinct lack of respect, as props for play, and as toys for his cat; the video demolishes Individual 1’s posturing. The other videos made by this user (blue node) react to questions from other users about ethics and ties their responses into their own experience of disability and community. Thus, we gain a snapshot of the broader conversation over one day, a glimpse into the human/faunal remains appreciations, and/or collecting community courtesy of a single facet, “#bonetok.”

The dialog, sharing, and duets/stitches spread with speed after August 10. The TikTok user community quickly identified a similar moment that had occurred on the Tumblr platform several years earlier, using the term “boneghazi” to explicitly connect TikTok in 2021 with Tumblr of 2015. Coined in reference to “Benghazi” (the 2012 attack on the Libyan city and its vitriolic aftermath especially for then-Secretary of State Hillary Clinton), “boneghazi” refers to an incident where a member of Wiccan/”witch” communities on Tumblr c. 2015/2016 (who later was identified and named via cross-referencing with posts on Facebook) was accused of either illicitly excavating remains from a pauper’s cemetery near New Orleans or, as later claimed, finding remains on the surface displaced due to flooding (Hall, 2015; Tourjée, 2016). While the context of each use of “boneghazi” is markedly different, its reuse demonstrates that the amount of positive and negative attention the ********** account has received in the approximately month and a half since the original “pride and joy” video was substantial enough for this online community to recall the one other instance of human remains collectors receiving such attention that they knew of. (Because TikTokers could use the term and expect to be understood, it also incidentally points to the migration of users away from Tumblr to the newer platform.)

5 A User Becomes a Hashtag

As mentioned in Section 1, Individual 1 emerged into widespread public consciousness on TikTok on or about August 10, 2021, with the posting of a video showing off his business’s “showroom,” including the now-infamous “wall of spines” – spinal columns, articulated with wire, hanging off clothes racks. Media outlets ran stories on the outrage/controversy/latest viral fad (depending on the spin of the outlet). As the network analysis of the “bonetok” tag demonstrates, very few posts were made in support. (We have seen screenshots of private bone collecting Facebook groups from where Individual 1 has been discussed, and in these instances at least, collectors have been very critical of the attention that Individual 1 has drawn to the trade in general.) But Individual 1’s account became its own tag (Figure 4 shows the histogram of posts made using that tag, collected in our scrape). On September 20, 2021, TikTok reported that the tag had 4.6 million views. What does it look like or mean when an individual user becomes a meme or new hashtag in their own right on TikTok? And what does this imply for the “archeological consciousness” of TikTok? (We cannot speculate as to what this might mean for Individual 1’s actual business, though he has posted a video in January thanking everyone for their support bringing “public awareness to osteology” holding up a print edition of a major newspaper that had done a story on him, but we note that it is a video with only 812 likes and 30 comments.)

We scraped the “**********” tag (the frequency of posts, and again extracted from the metadata the hashtags – to – hashtags network (to get a sense of the overall discourses), and the user mentions. We were able to retrieve 221 posts from 122 unique users and 368 unique tags. After filtering out a series of posts related to mixed martial arts (where a fighter goes by the same nickname as the vendor of human remains, hence the collision of worlds in the tags), we have 188 unique posts, 111 unique users, and 268 unique tags. (Figure 4 depicts the use of this tag over time in the posts recovered.) The network of tags to tags by virtue of co-occurrence in the same post makes for a network with 268 nodes and 2,009 edges. We also extracted from the metadata when a user explicitly mentioned another (using the “stitch” feature or reply); this network features 80 nodes (users) and 64 edges (explicit mentions); it is depicted in Figure 5. The reader may consult the file individual1-as-tag-explicit-mentions.csv.

Again, the same patterns are obtained. Individual 1 does not reply to any of the users explicitly mentioning him except for one, and it is to answer a question posed in the comments (rather than in a
new TikTok) about why teaching with a real skeleton is better than using a replica. He presents a facade of being interested in human remains for their educational usage; but as we have already seen, he is quite content to be entirely cavalier with the human remains he controls.

When we consider the hashtags – to – hashtags network (i.e., hashtags are connected by their presence in the same post; 268 nodes and 2,009 edges, individual1-as-tag-hashtags.csv), the top tags by betweenness (Table 3) are similar to the broader “bonetok” network, but contain some interesting new additions that demonstrate Individual 1 is not controlling the narrative as much as he imagines – “bonethief” seems to carry some negative connotations here, and the presence of “controversy,” “anthropology,” “history,” and “boneghazi” point to the use of the ********** tag as a kind of meta-level of commentary by users on the whole episode, pointing to a great deal of awareness among TikTok users of the very troubled history of human remains collecting (see also the discussion of the text analysis of the comments below).

We can search for modules or clusters again and then consider the most “between” tags for each cluster to get a sense of the discourses being used by TikTokers who also are using the ********** tag; this network is depicted in Figure 6. More tags in module 21 show a connection with #”witchtok” and invocations to Tumblr and the episode in 2015 where a person posting in the “witch” community on Tumblr mentioned they had bones for sale, scooped up from a cemetery in Louisiana. Clearly, many users from Tumblr migrated to TikTok, with a number of them referencing “boneghazi” in their responses to the **********.

Table 4 indicates the top tags by betweenness centrality within the clusters/communities/modules that are suggested by the structure of connections in this network. The presence of the “wtf” tag (“what the f....”) in Module 1, along with “science,” “osteology” and “bonetrade,” and “scienceethics,” points to one discourse at least that is aware of the ethical and scientific, humanistic issues that are at play (although the “whocares” tag suggests a certain population allied with Individual 1’s perspective). Alternately, the “whocares” tag could be here used as a challenge to defend the voiceless dead from perceived “abuse” by Individual 1. Modules 5 and 24 also correspond to discourse around ethics. Module 0 contains tags used largely by Individual 1 himself (“chonkyboi” is a reference to his cat, who he films playing amongst the bones); Module 21 is a mix of what is potentially two sub clusters, and some of the tags (xyzbca, foryoupage) are about trying to game the TikTok algorithm (a belief that using these tags will surface one’s videos to viral fame).
5.1 Images

We can also create metadata from the images themselves; this enables us to see if there is a distinct visual style related to these posts. As an initial experiment, we extracted key frames from each video we collected under the ********** hashtag, using the open-source software ffmpeg (where a “key frame” is, roughly, a point in the video where the content has largely changed from what came previously). Then, we sought to explore the image similarity of all of these keyframes. Some videos only had very few keyframes; some had many. A video with many keyframes indicates many cuts and changes of scene or intermixing with other videos, carrying a frenetic energy. We then used a convolutional neural network to create vectorized representations of these keyframes (a list representing 2,048 different dimensions of information that the computer “sees”) where the similarities of these vectors could be measured and reduced to two dimensions (using the “PixPlot” python software by the Yale DH Lab). The result is an interactive visualization allowing the user to zoom in and explore different clusters of images; Figure 7 shows a screenshot of the main interface window. (Since in the interactive visualization individual clusters are labeled by the software with

![Figure 7: The visual similarity of keyframes in the images rendered into a webgl visualization using t-sne to organize the images in 3 dimensions.](image-url)
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a representative image from that cluster and that many such labels clearly show individual TikTok users, we have cropped the image to remove that element of the interface.

We should note that this approach can create clusters with keyframes from *different* videos appearing in the same cluster; thus, the results should be understood as being about the composition of individual shots that comprise a video. We are currently working on a method to analyze and compare the entirety of videos against one another (drawing on Arnold and Tilton’s digital visual analysis toolkit, 2020).

The approach found 12 visually similar clusters of keyframe images. Two clusters are again the materials related to the ultimate fighting athlete that got caught up in the scrape because of hashtag overlap; it is interesting that both the network analysis of the hashtags and the visual analysis via CNN separate this material out. The keyframes in these posts feature a great deal of text, much of it with a kind of neon highlighting, over a closeup of a person’s face; we exclude them from further analysis. However, there is one keyframe from an individual engaging in “bonetok” that gets categorized in these two extraneous clusters. It shows a screenshot of a listing from Individual 1’s commercial online storefront, for a skull of an alleged Sámi individual, the Indigenous people of northern Fennoscandia; over the image the user has laid the text, “If you didn’t think you were doing something wrong, you wouldn’t have taken it down .... right?”

Cluster 1 is of a woman, addressing the camera directly, against a wall with a completely neutral background. There are no other images in this cluster.

Cluster 2 features several images that are visually very busy – complex scenes with domestic furniture, sometimes bookshelves or workbenches. There is usually a person in the scene.

Cluster 3 features keyframes that depict an individual facing the camera, often from the torso up, in a room where something is going on in the background (window, wall hanging, mirror, etc.).

Cluster 4 depicts the TikTok user where they have employed a green-screen effect to place themselves, from the chest upwards, on-top of the comments thread for a given post.

Cluster 5 is very similar to cluster 4, but the focus is cropped to the TikTok user’s face.

Cluster 6 again shows images of the user employing a green-screen effect to place themselves, mostly from the torso upwards, over top of specific posts by the ********** account; these “background” posts are drawn from other social media platforms in addition to TikTok.

Cluster 7 images are characterized by extremely dark lighting or indeed a kind of “credit roll” esthetic with text. One in particular reads, “this situation with ********** proves yt people shouldn’t be trusted.” This speaks to a theme picked up in the comments on the initial wall of spines video, where several individuals left comments related to the settler-colonial/“scientific racism” origins of human remains collecting, see the following text.

Cluster 8 are images associated with one TikTok user in particular who also participates in “witchtok” communities, dressed in black “gothic” clothing and make-up, against a black background so that her face appears in high contrast. This visual approach is sufficiently distinctive in the larger corpus of material we scraped to make its own cluster here.

Cluster 9 is composed of keyframes where the user’s face fills the frame.

Cluster 10 features users facing the camera from the waist up, against a light background (paneled walls, often) where the user’s words are also displayed in the foreground.

TikTokers, or at least, the ones responding to Individual 1, use a variety of techniques to get their messages across. Notably, the use of overlaid text in the images further complicates the videos and would not normally be caught in the trawl of metadata retrieved through scraping, which points to the need to develop methods that address the full multimedia that social media encompasses.

Individuals who indicate in their profiles or in their videos that they are “professional” in some capacity (including students) here at least are creating visually “simple” videos – facing the camera, perhaps using green screen effect to illustrate the content they are speaking to, or placing text over top of their own image to emphasize their words, in marked contrast to the frantic energy of Individual 1’s videos. Some individuals remix (one or more of) the original “**********” posts with their own (so-called hand-stitching) to underline the contradictions in the original posts. Some users will mix in screenshots of comments and frame their posts as a response. The playfulness and versatility that TikTok facilitates by making it quite easy to adapt and reuse others’ content in one’s own materials promotes different kinds of responses that largely
seem to map against whether a user appears to be “pro” or “anti” collecting, with the “anti” posts providing clear and critical responses, sometimes taking a sober approach, other times appealing to the visceral upset that many individuals feel when first realizing that there are people who buy and sell human remains today. The “pro” posts seem to revel in creating visuals that range from the playful to the shocking. While TikTok’s algorithm for deciding what videos to promote or queue up next is a closely guarded trade secret, experiments show that the single biggest factor appears to be time spent watching (WSJ Staff, 2021). Given the number of followers and views that ************** has accumulated on TikTok especially and his profiting in other print and televised media solely off of the controversy surrounding his TikTok presence (most recently, Frishburg 2022 and subsequent comedic discussion of this article within the “Meanwhile” segment of The Late Show with Steven Colbert, February 18th, 2022), it would appear that his strategy is working. However, as one of the anonymous reviewers of the initial version of this case study pointed out, it is an act of protest to refuse to use the same techniques and props that Individual 1 uses. The very contrast is itself an eloquent “no” to what this person does and represents. On Instagram, we do not see this kind of engagement, this kind of refusal; posts and accounts (as far as the trade in human remains goes) exist in isolation, going about their business buying and selling. Individual 1’s attempts to leverage TikTok on the face of it are only successful if we look at “likes.” It seems to us that he has instead created a community of active resistance to the human remains trade. Inadvertently, he is successfully teaching TikTokers why the trade in human remains is unethical.

5.2 Text Analysis

We initially did not scrape the individual comments left on Individual 1’s infamous post, since we were interested in the patterns of interaction visible through the stitch and duet features, and the implied connections via hashtags and the visuals. Upon the encouragement of one of the anonymous peer reviewers, we returned to the post to retrieve the comments. The scrape of comments on the initial video was conducted in February 2022. There were approximately 13,700 comments left on the post, some in threads hundreds of comments deep. The initial software package that we used to retrieve metadata could not retrieve these nested conversations. Instead, we manually paged through the results and scraped the text into a text file using a small parser that retrieved the comment text direct from the underlying html. This material could be reformatted so that we had a table with username, comment text, date of posting, the number of likes on the comment, and the number of replies to that comment. In the TikTok web interface, one could click through these replies, replies-to-replies, and so on. We selected a large, interesting subthread to scrape and analyze separately that circled around the legality of what Individual 1 was doing. Altogether, that provided us with 2,028 comments, a sample of about 15% of the total.

To give a sense of the flavors of the subthreads within the comments, we reproduce here the comments with the most likes and replies:

- “don’t worry it’s completely legal’ is the kind of answer that makes me worry more”: 41,600 likes, but only has 54 replies, and most of these are either @ symbols to attract someone else’s attention, questions of “why is this legal,” and patient explanations that what is legal isn’t always what is moral/ethical.
- “legality and morality are not the same”: 35,400 likes, and has 281 replies and is discussed further below.
- “And here is my spine collection’ then it’s not really ‘for science’ anymore but a room for your trophies”: 19,800 likes, 61 replies
- “There’s absolutely no way you have this many bones ethically. And the fact that you aren’t answering questions about it tells me all I need to know.”: 11,200 likes, 96 replies
- “these were people not rocks to collect. have respect”: 7,841 likes, 110 replies
- “I’m an actual anthropology student who focuses on human remains and osteology and this is totally not okay”: 6,592 likes, 69 replies
- “some real colonizer energy we’ve created here today”: 4,167 likes, 41 replies
I’m have a PhD in biological anthropology and I work in clinical anatomy. While it may be legal it is certainly unethical.

The fact that your PRIDE AND JOY is human spines says enough tbh.

(There were also multiple comments, framed in a variety of ways, calling out Individual 1 for not actually replying to anyone’s questions in the comments, despite his “promise” to do so).

Topic modeling, as a way of obtaining a macroscopic perspective on the discourses in a body of text, has been used in archeology to explore how field notes form archeological knowledge (e.g., Dallas, 2015). A topic model imagines that writers write by pulling words in varying proportions from buckets (“topics”) that correspond to particular ideas (Graham et al., 2015, pp. 133–158). The algorithm looks at the complete corpus of text and considers every word’s proportion in a particular document (here, an individual comment) versus the entire corpus and all the other words (all of the top-level comments). If we tell the computer to assume 10 topics, the computer can work backward from that distribution of words to probabilistically determine which words go together into which topics, and the varying proportion of each topic’s contribution to the composition of each source document. A topic model doesn’t provide “the answer”; it provides lenses for looking at our information. When we use topic models, we fit several with varying numbers of topics to see which “lens,” as it were, provides the best insight.

For the top-level comments, we used the gensim python package to fit a topic model to the posts, to see what overall patterns of discourse might be present, and then visualized the similarities of the topics using the pyLDAvis python package. We found that a topic model with six topics best captured the variety of discourses, see Figures 8 and 9; the visualization uses principal components analysis to map the distances between the topics.

The first two topics (that overlap slightly) are composed of words expressing incredulity that people collect human remains. The main difference between the two topics is the expression of that incredulity – one topic is characterized by comments along the lines of “I have questions,” while the other has comments

Figure 8: Visualization of the inter-topic distances from a topic model fitted to the top-level comments. The size of the circle reflects the distribution of that topic across the corpus of comments, while the position reflects the similarity of topics in two dimensions. The topic model was generated by the Gensim package for Python, while the visualization was created using pyLDAvis for Python.

• “I’m have a PhD in biological anthropology and I work in clinical anatomy. While it may be legal it is certainly unethical”; 3,215 likes, 33 replies
• “the fact that your PRIDE AND JOY is human spines says enough tbh”; 1,612 likes, 13 replies
imagining ghosts, or the surprise/shock/horror that visitors to Individual 1’s house might feel. Topic 3 turns around the imagined interactions with, and effect on, Individual 1’s cat (and, deeper within the results, questions of ethics). Topic 4 focuses on the legality of what Individual 1 is doing and frequently contains comments that specifically reference settler-colonialism, white-supremacy, or scientific-racism. Topic 5 is close to Topics 1 and 2, and again, focuses on the viewer’s reaction, expressing desire to have or to collect bones of their own (frequently making a joke of it), while topic 6 is similar to topic 3 and focuses on potential “bad” effects of owning bones (including legal issues). The topics are all more or less similarly sized, demonstrating a fairly equal distribution of the topics across all the top-level comments.

We ran the same analysis, but this time on the long thread where TikTokers were arguing over the morality/ethics of this trade (as a subthread, this was not considered in the previous analysis). This time, we found that five topics clearly emerged, see Figure 9. The largest topic captures the flavor of the debate well – the words “rape” and “consent” feature prominently, which ties back to a recurring theme in this thread comparing the lack of consent of the people whose remains Individual 1 collected to a commenter’s argument that “rape is similarly about lack of consent” (paraphrased). Topic 3 is a topic composed largely of replies to the previous discourse and its rape analogy, as is Topic 6; the difference with Topic 6 is that it uses “murder” as its analogy, as in (to paraphrase), “murderers presumably think they’re in the right too.” Topic 2 draws attention to the problem that the origin of these human remains is not known, and some commenters raise the historical sourcing of anatomical study skeletons from India and China. Topic 4 is a discourse about the form of others’ arguments (the strawman fallacy is charged) and the fact that so much about the human remains trade is (paraphrasing again) fundamentally unknowable, while Topic 7 is again concerned with the form of argument and the shifting of goal posts. Finally, Topic 5 is similar to Topic 1, but separates out because of a concern with “society” as well.

A number of comments and replies (in the top-level comments, and in the subthread) contain someone’s username, and emoji characters signifying some sort of emotional reaction; these posts serve as a kind of topic on their own (although because of their brevity, not one formalized in the topic model), a flag

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**Figure 9:** Visualization of the inter-topic distances from a topic model fitted to a subthread of comments. The size of the circle reflects the distribution of that topic across the corpus of comments, while the position reflects the similarity of topics in two dimensions. The topic model was generated by the Gensim package for Python, while the visualization was created using pyLDAvis for Python.
to attract other users’ attention. Nearly 600 of the top-level comments contain the “@” symbol, which is prepended to a username for this purpose.

This distant read of the top-level comments, and of the one large subthread, shows again that TikTokers are viewing Individual 1’s post not within the framing that he wants but rather through their own understandings of colonialism, law, and ethics (several call him out expressly for his claim of “being here to answer questions” but ignoring everyone’s comments). It is a kind of discussion that we do not observe in the comments on human remains posted to Instagram, where any kind of “legal” topic is more of an invocation by the original user who made the post that “yes this is legal” (Graham & Huffer, 2020).

6 Conclusion

This discussion of influence over TikTok, and the identifying of clusters of discourses or ideas, the direct responses to Individual 1, and the many TikTok videos produced to refute or argue with Individual 1’s videos promoting his “lifestyle” (“collecting human remains is legal!” he says over and over again, while fawning over the “beauty” or “uniqueness” of the remains he collects/sells) and business can also be seen as an episode in which people (seemingly, many for the first time) learn about the multifaceted and complex underpinnings of today’s human remains trade in light of the histories of medicine and anthropology and colonial-era collecting. Response to Individual 1’s content, therefore, has highlighted not just legal and ethical issues, but how the remains in his possession have been handled and displayed. The kind of learning that happens on these kinds of platforms is messy and informal, and, as Michael Dezuanni (2021) reminds us, constant. Dezuanni, drawing on a variety of research connected to how “peer pedagogies” work in online platforms, especially video based, explains that

“Peer Pedagogies’ recognizes that in digital contexts individuals often learn from other individuals, regardless of if the ‘teacher’ in the relationship is directly known to the learner, and regardless of if ‘teaching’ is intended or purposeful. For instance, peer pedagogies and learning are frequently central characteristics of the relationships that form between ‘micro-celebrities’ and their fans.” (Dezuanni, 2021)

Dezuanni’s research explores the phenomenon of “#Booktok.” Like “#bonetok,” this hashtag unites a variety of people around talking about books via TikTok. Dezuanni’s research identifies two kinds of videos in the #booktok world; one is reader-centered and involves a kind of conversation around books, new authors, and the worlds depicted within the covers; the other involves a kind of “habitus” where books are status objects to be consumed. We see a similar broad bifurcation in the videos we have scraped and analyzed here. Individual 1’s videos promote “a habitus,” a normalizing and a glamorization of the bone collecting lifestyle; other videos (without perhaps the same reach) use the same kinds of techniques visually and rhetorically to show off collections and inspire others to do the same. This is a realm that practicing and ethical archaeologists, bioarchaeologists, and anatomists cannot enter; no more than a field archeologist could create educational social media content about looting by depicting themselves looting a site we cannot in good conscious handle or display human remains to “fight fire with fire” and present perhaps more accurate educational content compared to those dealers who seek to give their business a veneer of “education” like Individual 1. Within the #bonetok world though, there is also a peer pedagogy around ideas of osteology, ethical engagement with osteological research (human and other animals) and a desire to provide public knowledge about how human remains were obtained and migrated into the market in the first place, including but also apart from responses to Individual 1’s content. These videos facilitate and invite conversation around the topic, while spilling over into other “universes” in TikTok. They use a restrained and careful, quiet framing to highlight and contrast with Individual 1’s videos, a deliberate countering of his work.

We were struck by how TikTok, as a platform, seems to facilitate pushback in a way that other platforms do not; in our research on Instagram for instance, we have very rarely come across posts that call out
another user, or engage with the ethical and moral issues presented by bone trading, to the extent that can be regularly seen on TikTok, at least for now and in relation to Individual 1’s particular account. Similarly, the interconnectivity of tags shows a wide range of discourses that frame people’s engagement, with both pro- and anti-sides, in a way we have not seen on Instagram. Our research on Instagram shows how Instagram forms tastes and works as a platform for connecting buyers and sellers. Here, we see Individual #1 using TikTok like shock advertising while at the same time through the “peer pedagogy” that Dezuanni identifies, other users create opportunities for pushback and discussion of the moral and ethical and legal issues around human remains. We suspect in fact that the viral “success” of Individual 1’s posts is doing far more to teach and inform a broader audience of the harms of the human remains trade than what we might expect if we just look at “likes.”

This presents us with an opportunity – there are engaged audiences here for what we do, and especially, how and why we do it. There is a community of archeology and bioarcheology content creators who have put considerable time and effort into producing effective science communication around a host of topics, leveraging their pre-existing platforms to add to the strong push back against Individual 1’s content in August and September 2021. The rest of us need to support their work. At the same time, archeologists interested in the public “consumption” of archeology need to understand its norms and the way learning happens on TikTok and other platforms to be effective, should they wish to join.

So what are we to do? TikTok’s affordances and user communities – unlike other platforms we have studied – offer powerful ways to frame the conversation in ways that work toward better outcomes.

While TikTok has “community guidelines” that prohibit “content that offers the purchase, sale, trade, or solicitation of unlawfully acquired or counterfeit goods” (TikTok, 2021), Individual 1 is always careful to frame the videos as “educational,” never as advertisements. Merely being unethical is not enough to be removed from the platform; the videos do not appear to contravene the terms of service. (One of us (SG) has met with TikTok employees responsible for internal procedures monitoring the “gray” areas and other similar activities, and the question of real-world legality or not of the human remains trade is a complicating factor). Other platforms are known to merely delete content that contravenes terms of service, which has the effect of deleting evidence. Rather than report such videos to the platform itself, we suggest downloading copies to share with appropriate authorities. Then, if it is safe for one to do so:

- Compose response videos that are calm and collected in tone, that highlight the issues
- Engage in the comments to provide the hooks on which counter narratives can be hung
- Use strategies of peer-to-peer learning to discuss the contentious material (the way #********* became a hashtag) in a way that removes the oxygen from the original post
- Look up the laws in one’s own jurisdiction and when appropriate/safe, draw attention to these in the comments
- Make it easy for TikTokers to find other good quality information to draw on. Publish open-access research and point to that research in the comments (and if discussing a TikTok video on another platform that permits it, link directly to the research)
- Leverage the power of peer-to-peer learning; support students and colleagues who engage on the platform by recognizing how this work can be scholarly “knowledge exchange” (Boyd, 2022)

As we write this, TikTok is planning to shift to longer-form videos (10 min), in an apparent challenge to YouTube (Vincent, 2022). Longer videos will complicate the patterns we have discussed here, but will also offer new opportunities for engagement to challenge human remains traders – but also, no doubt, new opportunities for those who trade in human remains to promote their “lifestyle.”

### Supplementary Materials

Following Supplementary Materials are attached to the article:

readme.md
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References


