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Exploring Time-Coded Comments on YouTube Music Videos of 'Top 40' Pop 2000–20

Eamonn Bell

As part of a larger project to understand the way that structural features of the design and implementation of radio technology influences its audiences – calling this the medium's 'physiognomy' – Theodor Adorno opened the mailbags of the radio stations he was studying and a torrent of 'fan mail' flooded out.[1] Adorno argued that listeners' 'feedback', their obsequious suggestions for change to the station's music programmers (whom he accused of the standardization of sound culture as he knew it), masked a desire to assume the position of radio management, despite their apparent antagonism towards it.[2] Their letters reveal the contradictions that inhere in audience feedback and, usefully, often take music as their starting point. If, as Martin Scherzinger suggests, Adorno's model of technological critique is robust enough to support a new 'software physiognomy', readers interested in the relationship between online audiences, digital media technology, music and mass culture would do well to turn to YouTube: both a top-flight distributor of music in the twenty-first century and a lively forum for user-generated discussion about music and musical culture, hosted in its notorious comment section.[3] Here, I explore the intersection of these two functions of this platform. This is possible because YouTube has, since 2008, allowed users to easily create links that navigate directly to a given fragment of an online video: the website detects text comments that resemble valid time codes and renders each time code as a clickable hyperlink. The link skips the user directly to the moment in the video cited and (optionally) starts

[1] Theodor W. Adorno, *Current of Music: Elements of a Radio Theory*, trans. Robert Hullot-Kentor, English edn. (Cambridge: Polity, 2009), 105ff.
[2] Ibid., 108.
[3] Martin Scherzinger, 'Software Physiognomics: Adorno's Radio Analytics Today', *New German Critique* 43, no. 3, 129 (November 2016): 53–72.

playback at that point. These time-coded hyperlinks (e.g. '0:45 is my favorite part!!') are also sometimes called 'deep links', because they use the structure of URLs to refer to 'deep' within the resource referenced by the hyperlink. Here are some examples of time-coded comments on music videos, all released in 2017:

- On a lyric video for The Chainsmokers and Coldplay, 'Something Just Like This' (2017): 'The melody at 3:34 Shouldn't be underestimated because thats my favourite part and i repeat many times'
- On a video for ZAYN ft. Sia, 'Dusk to Dawn' (2018): 'If you wanna repeat the best high note of this masterpiece: 5:15'
- On a video for Taylor Swift, 'Look What You Made Me Do' (2017): 'If u play the song at x2 speed, listen to the background music in the chorus it sounds like a snake rattling 2:06 – 2:19 3:06 – 3:19 3:22 - 3:35'

In this chapter, I examine comments like this; following Raynor Vliegendhart et al., I call them time-coded comments (TCCs).[4] I first describe the historical background to TCCs on the Web and their use to date as a source for musicology. Then, I summarize their use in a large (over 1 million) set of TCCs responding to about 200 popular music videos on YouTube, with the help of a computational text analysis technique called topic modelling. This shows the variety of uses of TCCs by listeners on YouTube and paints a portrait of listening practices during this period which make use of the technological affordances of the platform, what might be called the platform's software physiognomy. I also examine some non-normative uses of these comments, which push against the prevailing interaction types afforded by YouTube. Finally, I sketch the problems with and potential futures for the use of this kind of information by digital musicologists and other students of online musical culture.

YouTube Comments as a Source in Musicology

A recent report for the Netherlands Institute for Sound and Vision Archival Studies makes a convincing case for the preservation of YouTube comments specifically as a matter of preserving our digital media heritage, despite the

[4] Raynor Vliegendhart, Martha Larson, Babak Loni and Alan Hanjalic, 'Exploiting the Deep-Link Commentsphere to Support Non-Linear Video Access', *IEEE Transactions on Multimedia* 17, no. 8 (August 2015): 1372–84.

technical, financial and legal hurdles to doing so.[5] Certainly, the promise of YouTube comments has long been recognized by those interested in understanding and preserving online music cultures. An early example of the sustained and careful use of YouTube comments can be found in Áine Mangaoang's work on the Cebu Provincial Detention and Rehabilitation Center prison dancers in the Philippines.[6] Amanda Edgar analysed over 5,000 comments and replies underneath recordings of N.W.A.'s 'Fuck tha Police' and pointed out how music and entertainment videos open up the possibility for counterhegemonic discourse within the largely corporate frame of the YouTube comment section.[7] Edward K. Spencer has provided a compelling case for the usefulness of qualitatively coded YouTube comments to understand the complex relationship between spectral features, somatic response, emotion and the conspicuous consumption of music represented in comments on recordings of electronic dance music (EDM).[8] While comments with time codes occasionally appear in work like this, they are usually used sparingly and their distinct affordances are rarely taken as the main object of analysis.

This chapter therefore shifts focus away from what we might learn about any one musical setting with the help of TCCs, towards what we can say about the use of TCCs themselves, admittedly within the broad frame of mainstream, Anglophone pop music video consumption on YouTube. Since commenters can use time codes to a specific moment in the parent video rather than to the video as whole, TCCs offer a distinctive precision and temporal resolution above and beyond the average YouTube comment and thus provide even greater potential value for both musicologists and the designers of new information retrieval systems. A closer focus by musicologists on TCCs in reply to music videos is justified, then, because time codes ultimately help commenters reason about their experiences by allowing concrete reference to the sounds they report hearing, without the mediation of transcription or conventional music notation. For example, one user comments on the music video for Fifth Harmony's *Work from*

[5] Jack O'Carroll, 'YouTube Comments as Media Heritage: Acquisition, Preservation and Use Cases for YouTube Comments as Media Heritage Records' (The Netherlands Institute for Sound and Vision Archival studies [UvA], 2019).

[6] Áine Mangaoang, *Dangerous Mediations: Pop Music in a Philippine Prison Video* (New York: Bloomsbury Academic, 2019).

[7] Amanda Nell Edgar, 'Commenting Straight from the Underground: N.W.A., Police Brutality, and YouTube as a Space for Neoliberal Resistance', *Southern Communication Journal* 81, no. 4 (7 August 2016): 223–36.

[8] Edward K. Spencer, 'Re-Orientating Spectromorphology and Space-Form Through a Hybrid Acoustemology', *Organised Sound* 22, no. 3 (December 2017): 324–35.

Home (2016): 'Who provides the long note at 3:01-3:04? It sounds like Camila at the start and Dinah at the end. Is it both of them?' User-generated content online is the locus of community knowledge that exists outside of formal institutional settings; for TCCs on music videos and other YouTube videos with significant musical content, this body of knowledge is a genuinely analytical one. Time codes allow users to obtain the referentiality that some musicologists think of as central to music analysis, despite the fact that comments lack the trappings of close readings, such as music examples and measure numbers. As the YouTube platform pushes twenty years of age, a longitudinal study of its TCCs promises a tantalizing glimpse at historical shifts in listening practices, as the last seventeen years of its history have witnessed significant changes in the digital sites of pop music listening and ownership, from self-contained, 'dumb' portable media players (such as CD players and MP3 players) to always-connected, always-collecting streaming clients (such as smartphone and desktop applications).

Methodology

In the rest of this chapter, I examine some of the common uses of TCCs by users watching pop music videos on YouTube in a set of over a million TCCs. Topic modelling is a computational technique that summarizes commonalities in a set of textual data by clustering these texts, or documents, based on terms and phrases that each document shares with others.[9] It helps us reason about large collections of text, based on the 'topics' that each text treats. I model 1.2 million TCCs on approximately 200 music videos for pop songs hosted on YouTube in late 2021. These YouTube music videos appeared on a marginally popular playlist entitled 'Hit Songs 2000 to 2020 – Top Hits 2000 to 2020 Playlist' posted by the Red Entertainment Group, a Romania-based content curator active on YouTube under the 'Redlist' brand. The complete list of videos included in the dataset admittedly reflects a bias towards Anglophone Top 40 popular music, with release dates unevenly distributed over the period from 2000 to 2020. Though the precise criteria for inclusion on this playlist are opaque, this is true of most curated playlists on YouTube and is typical of non-label promotional

[9] The treatment here of the technical detail of topic modeling and its various implementations is necessarily abbreviated. For a gentle introduction to topic modelling, see Scott Weingart, 'Topic Modeling for Humanists: A Guided Tour', *The Scottbot Irregular*, 25 July 2012, http://www.scottbot.net/HIAL/?p=19113.

activity on the platform. These comments were collected with the help of the open-source software yt-dlp (a fork of the popular youtube-dl tool) and GNU Parallel, led by Ole Tange.[10] A 30-topic BERTopic model was trained on a random sample of the full text of 200,000 TCCs. The fitted model was used to make single-topic predictions for every one of the 1.2 million TCCs in the dataset.[11] TCCs that express similar or identical topics should be similar to each other, if not in tone and intention, at least in content. The BERTopic technique was chosen as it makes use of contemporary natural language processing techniques in widespread use, so-called neural or semantic-space models of language, the importance of which is described briefly in the conclusion.

BERTopic also supports agglomerating discovered topics based on their similarity. This is crucial here, since preliminary experiments surfaced several hundred distinctive topics within the dataset: these have been further clustered manually into thirty distinctive topics. I have given a loose, personal–interpretative label for each topic to help orient the reader towards the 'findings' of the topic model. Notably, a large proportion of the TCCs does not fall easily into one of these thirty categories and is not assigned to a topic by the trained model; these residual comments are covered in part in this chapter and many features of the TCCs are described, though they demand further analysis. The results of this process are summarized in Table 12.1. Next, I further aggregated closely related topics into a more manageable number of 'TCC types'. For some of these types, I describe their distinctive features and give a number of TCCs that exemplify them. I also examine some examples of non-normative uses of TCCs, which are less common in the dataset and therefore are not prominent within the thirty clusters surfaced by the topic model. Such TCCs do not always obviously refer to the specific content of the music video. Rather, they often represent either humorous or ironic engagement with the platform's affordances or, sometimes, a failure to correctly handle time code-like text (e.g. clock times and references to scripture) on the part of the platform.

[10] 'GitHub – Yt-Dlp/Yt-Dlp: A Youtube-Dl Fork with Additional Features and Fixes', https://github.com/yt-dlp/yt-dlp; Ole Tange, *GNU Parallel 2018*, March 2018.

[11] Maarten Grootendorst, 'BERTopic: Neural Topic Modeling with a Class-Based TF-IDF Procedure', *arXiv*, March 2022, https://doi.org/10.48550/arXiv.2203.05794.

Table 12.1 Aggregate Results of a 30-Topic BERTopic Topic Model Trained on a Random Sample 200,000 Comments Extracted from a Larger Set of TCCs and Used to Predict Topic Assignments for the Full Set of 1.2 million TCCs, Posted in Reply to Parent Videos Representing Music Popular in the Anglosphere between 2000 and 2020

BERTopic Number	Topic Words	Interpretative Label	Comment Count	(% total)	Mean Like Count
−1	yeah tcctimecode like girl need	unclassified (see Methodology)	739,162	61	5.92
0	tcctimecode np doe tcctimecodework pregnet	time code only – 'bare' time code	113,903	9	0.66
1	drake lol tcctimecode did notice	celebrity spotting	29,170	2	2.61
17	david guetta looks pitt brad	celebrity spotting	9,862	1	2.50
23	homework whats girl song know	who is that?	9,035	1	3.58
21	looks like miranda carly look	celebrity spotting	8,833	1	1.86
29	hair shawn camila flip camilla	[incoherent] celebrity spotting	6,837	1	8.74
			63,737	*5*	
3	best tccrange moment tcctimecode song	best part/best section	25,093	2	3.59
5	favorite tccrange fav favourite song	best part/best section	17,199	1	4.20
19	tcctimecode later thank best parte	best part/best section 'thank me later'	9,243	1	8.97
25	love bee minecraft postal song	best part/best section	7,665	1	3.85
			59,200	*5*	
4	dance dancing cool moves dancer	noticing dancer	16,724	1	4.34
8	dab teacher marshmello shes tcctimecode	noticing dance moves	12,819	1	7.23
			29,543	*2*	
16	wtf boobs clown boob tcctimecode	noticing something shocking/titillating	11,546	1	1.95
13	dead walking omg scared killed	noticing something shocking	10,685	1	2.75
26	tccrange wut lol wth cringe	noticing something shocking	6,984	1	1.43
			29,215	*2*	

7	pause left girl creepy head	pause to see something shocking	13,637	1	1.83
10	minuto el ghost en fantasma	pause to see something shocking	12,072	1	1.25
			25,709	*2*	
2	pm watching views 2018 tcctimecodepm	listening-log comment	23,470	2	4.47
9	face epic tho lmao look	noticing a facial expression	15,254	1	2.01
22	hand tattoo arabic fly protection	noticing hands, arms and tattoos	7,927	1	12.91
			23,181	*2*	
27	tcctimecode frosch grandpa tcctimecodetcctimecode der	0:00 comments, multiple per comment	8,307	1	5.38
28	replay button tcctimecode free buttons	replay buttons/0:00	7,513	1	22.41
			15,820	*1*	
11	xd badak bra tcctimecode ikan	[incoherent] mix, including bahasa Indonesia content	13,749	1	1.55
6	video tcctimecode chat tik tok	inbound viewers from TikTok	13,678	1	4.68
12	jesus god christ lord shall	biblical references 'spam'	11,140	1	2.66
14	fuck said say karate says	WTF (and assorted profanity)	10,583	1	6.13
15	voice singing sing song pitbull	noticing the song	9,795	1	4.22
20	starts start song music magic	'song starts here'	9,660	1	3.06
18	phone samsung apps messaging missed	ASCII-art comments	9,426	1	5.60
24	illuminati eyes eye confirmed close	noticing symbolism in video (illuminati)	8,391	1	2.09
			1,209,362	**100**	**4.94**

These results were used to inform the discussion of TCC types in the associated chapter but do not entirely cover the spectrum of commenting behaviours in the dataset.

Some Types of TCCs on Pop Music Videos on YouTube

Affect

Buried within individual TCCs, then, are deep emotional and affectual responses to music videos – both their visual and sonic content – expressed without the technical vocabulary of cinema and music.[12] For example, this allows a commenter in reply to Amy Winehouse, 'Back To Black' (2006), to explain their reaction to the one-off bridge section before the song's final chorus:

> 2:45 . . . this part breaks me a little. Idk why but I remember about all the times I've cried and nobody was there to help me. . . . I lost many friends time ago, then I've always been shy and I don't trust people, so I don't talk that much . . . then I've also been in love with a boy, he didn't love me back and I was really hurt.

As with all online text, there is a risk that the kinds of topics treated by authors skew towards those likely to attract approbation: relatively long, 'deep meaningful comments' are popular on the platform, though the above-cited comment attracted a modest thirty-five likes. But shorter and less popular comments also capture something of the emotional experience of listeners. On Taylor Swift's 'Wildest Dreams' (2014), for example, a commenter simply writes 'Best moment at 0:40 Makes me feel torn and at the same time like i'm in love' in exchange for no likes: marginal attention from other users. By contrast, this TCC, posted in response to Billie Eilish's 'everything i wanted' (2019), captures the close and intricate relations between affect ('vibes'), autobiographical memory, musical memory (the connection with the video game soundtrack) and interpretation:

> At 2:08 it gives me the vibes of when we used to play that weird sonic game as a kid and if he was underwater for too long it would play these sounds and I remember it being close to the 'do do do dO' in the background so. And it completely makes sense because if she is under water too long she will ya know . . . drown.

On occasion, users will enter into dialogue with each other and try to offer explanations for how the music works, as in this exchange in response to twenty-one pilots, 'Heathens' (2016): User A (233 likes), 'This song gives me goosebumps and I don't know why'; User B (six likes), one of twenty replies, 'It

[12] See the previous chapter in this book, Alexandra Lamont, Scott Bannister and Eduardo Coutinho, '"Talking" About Music: The Emotional Content of Comments on YouTube Videos'.

actually is because of the music. The chord at 00:23 is a D major with an E. That makes it have an eerie feel to it.' Despite its inaccuracies, comments like this show at least an attempt to marshal music's affective qualities in familiar music-analytical terms.

Musical Structure

TCCs can also help us understand the social construction of musical structure: how structurally significant moments in particular genres reflect not only salient musical features that inhere in sound but also conventional and affectual functions shared by a group of listeners. Researchers have already shown how information in TCCs on SoundCloud recordings of 100 mainstream electronic dance music tracks can speed up the automatic detection of the structurally significant and generically typical 'drop', through the use of more conventional music-analytical techniques.[13] TCCs reveal not only where listeners hear a drop (as in 'The drop is where CadiB [*sic*] comes in 2:53 <— click it (you know you want to)', on Maroon 5, 'Girls Like You' (2017)) but also where their expectations about where the drop *should* be are violated (as in '1:40 bit disappointing, where's the hard drop?' on Clean Bandit, 'Symphony' (2017)). Another structural use of TCCs worth calling attention to, not represented in the data analysed, is to compile track listings for transfers from analogue media or for recordings of live musical performances. These TCCs can include valuable information about as-yet-unreleased or unknown tracks, sometimes known as 'Track IDs' (especially in electronic dance music circles).[14] TCCs also afford intertextual links between songs on the basis of their lyrics. For example, one commenter annotates the Billie Eilish track 'goodbye' (2019), showing how the lyrics of the final track of album of the same year, *When We All Fall Asleep, Where Do We Go?*, recapitulate the preceding tracks. This fan work garners the commenter over 2,000 likes. The likes and replies that comments like this accumulate

[13] Karthik Yadati, Martha Larson, Cynthia C. S. Liem and Alan Hanjalic, 'Detecting Drops in Electronic Dance Music: Content Based Approaches to a Socially Significant Music Event', in *Proceedings of the 15th International Society for Music Information Retrieval Conference (ISMIR 2014)* (15th International Society for Music Information Retrieval (ISMIR) Conference, Taipei, Taiwan, 2014), 143–8; Karthik Yadati, Martha Larson, Cynthia C. S. Liem and Alan Hanjalic, 'Detecting Socially Significant Music Events Using Temporally Noisy Labels', *IEEE Transactions on Multimedia* 20, no. 9 (September 2018): 2526–40. See also, Paul Lamere, 'The Drop Machine', *Music Machinery – a Blog about Music Technology by Paul Lamere* (blog), 16 June 2015, https://musicmachinery.com/2015/06/16/the-drop-machine/.

[14] Steven Colburn, 'Filming Concerts for YouTube: Seeking Recognition in the Pursuit of Cultural Capital', *Popular Music and Society* 38, no. 1 (2015): 59–72.

evidence time spent imposing temporal structure on music using TCCs; this time is exchanged for the fan capital that these 'engagements' represent.

Imagery

Users often use time codes to give a temporal structure to their observations about the imagery in music videos, supporting hearings of the music with concrete reference to the accompanying video. Commenting on the video for Little Mix's certified UK platinum release 'Black Magic' (2015), one user uses TCCs to put a somewhat finer (if, admittedly, relatively blunt) point on the video's retrogressive sexual politics:

> morale of the story 1. 0:18 nerdy girls are clumsy and unattractive 2: 0:36 you get to be a royal bitch if you are **hot** 3. 1:38 you need to dress **hot** and slutty to attract the boys 4. 1:59 only when you are **hot**, you get to bully others. dont you dare stand up for yourself when you look like a loser 5: 2:17 same for guys, if you are not **hot** you need magic 6 3:05 instead of helping e class pay attention, use your magic to make the class go fun and crazy yup, a very faithful murica production.

A more popular comment, containing an extended time-coded interpretation of the music video for Sia's 'Chandelier' (2014), is reposted several times and reads the video's extended use of dance as a parable for alcoholism and depression. It is not always straightforward to disentangle filmic interpretation from musical observations, as this excerpt from a longer response to Adele's 'Hello' (2015) makes clear:

> So lets analyze this [. . .] @ 1:21 'Hello it's me' . . . (as stated below . . . she wins the Granny here) @ 1:45 'Hello, Can you year me?' This is so good that I had to make it my ring tone [. . .] @ 2:26 . . . that slow blush of the eyes . . . and that sweet pain in her voice. Man, I can go on an on . . . but here is what it is . . . it gives you goose bumps, orgasms, and takes you into a state of Nirvana, all at the same time .. What a song and what a beauty !!

The combination of music and moving image in music video is its hallmark as a cultural form: this affords ready connections with other music videos along multiple axes of comparison. Predictably, commenters are quick to pick up on these allusions and identify them with time codes, as in the case of Anne-Marie's '2002' (released 2018) which fittingly invokes early 'oughties releases by Britney Spears, N*SYNC and more. It also poses challenges for the computational analyses of TCCs, as their references to sound and vision are rarely determinate.

Listening-Log Comments

YouTube's straightforward algorithm for detecting time codes in comment text often incorrectly converts text that resembles a time code, such as clock times (e.g. 12.01 am) or some non-conventional formats (e.g. 01:05:20 – i.e. 5 May 2020), into clickable TCCs. Thus, another common TCC type is the 'listening log'-type comment. Here, a user either simply states a date and time we assume corresponds to their local time while listening or appeals to other users to determine who else is 'out there' listening at the same time. For example, this comment responding to Coldplay, 'Hymn for the Weekend' (2015), is typical: 'Hey it's 11:16 pm March 7th, who's watching right now? Write your date and time ^_^'. Sometimes these journal entries appear with more or less effusive praise for the track, though they are more likely to be unqualified. However, they are sometimes maintained by dedicated fans who return to and update their comments with the time and date of their latest relisten, occasionally with a record of their location or emotional state at the time.[15] These are ripe for parody, of course, with one commenter writing in 2016, in response to Adele's 'Hello' (2015), 'Hoo wach it in nuketown 2025 18:35pm', and another, in response to Akon's 'Smack That' (2006), 'who's watching on 7 December 1941 at 7:48 in Hawii??????'.

0:00 Comments

Users worked around the platform's lack of the replay feature by making tactical use of the comment sections' deep-linking function to curate comments that can be used as surrogate, since they contain a link to the start of the music video. 0:00 comments can demonstrate that a user enjoyed the video enough that they immediately sought to 'rewind' to the start of the track; occasionally, the time code is embedded inside a message of approval (e.g. 'M0:00AR', 'm0:00re!!!!').[16] Less popular than many of these more light-hearted topics is the use of 0:00 comments to circumvent pre-roll video ads on YouTube. We might think about these efforts as attempts to deprogram the specific televisual 'flow'

[15] See, among others, Tia DeNora, *Music in Everyday Life* (Cambridge: Cambridge University Press, 2000).

[16] 'M0:00RE', Know Your Meme, accessed 19 March 2022, https://knowyourmeme.com/memes/m000re.

imposed upon YouTube's archive by its corporate stewards.[17] This one simple trick was supplanted by more sophisticated ad blockers and, in exchange, more sophisticated mitigations: anti ad-blocker techniques. Still, an interesting economy surrounds these 0:00 comments, dividing authors who describe themselves as 'offering' the time codes for use into two broad groups: those who freely offer the link without expecting anything in exchange and those who claim exact "payment", usually in the form of likes, which place the comment (and the author's account) more prominently in YouTube's screen real estate.[18]

ASCII-Art Comments

The standard YouTube player user interface (UI) encourages 'all-the-way'-through engagement with a video and forces users to view ads before progressing to the rest of the video content. Lately, the platform automatically plays algorithmic recommendations for the next video. Some researchers in the field of human–computer interaction have already proposed alternative interfaces for online video players that leverage the information about the video content that is contained in its TCCs.[19] Interestingly, commenters themselves have come up with their own, bottom-up solutions, simulating the user interface of a media player in their TCCs. Complete with fictitious playback buttons (play, pause, etc.), time-elapsed indicators and progress bars, these comments represent the vestigial features of digital music players that predate the YouTube moment. These relatively brief comments are almost always copy-pasted from a small source of base 'player' styles (see Figure 12.1, examples A–E) and often minimally adjusted to reflect title and duration of the parent video. These snippets of ASCII-art, sometimes called 'playlist decor', are collected in sites like

[17] Raymond Williams, *Television: Technology and Cultural Form*, 3rd edn, Routledge Classics (London: New York: Routledge, 2003), ch. 4.

[18] For an example of similar ironies in other online spaces, see Blake Durham and Georgina Born, 'Online Music Consumption and the Formalisation of Informality: Exchange, Labour and Sociality in Two Music Platforms', in *Music and Digital Media: A Planetary Anthropology*, forthcoming.

[19] Raynor Vliegendhart, Martha Larson and Alan Hanjalic, 'LikeLines: Collecting Timecode-Level Feedback for Web Videos Through User Interactions', in *Proceedings of the 20th ACM International Conference on Multimedia, MM '12* (Nara, Japan: Association for Computing Machinery, 2012), 1271–2; Raynor Vliegendhart, Babak Loni, Martha Larson and Alan Hanjalic, 'How Do We Deep-Link? Leveraging User-Contributed Time-Links for Non-Linear Video Access', in *Proceedings of the 21st ACM International Conference on Multimedia, MM '13* (Barcelona, Spain: Association for Computing Machinery, 2013), 517–20; Vliegendhart et al., 'Exploiting the Deep-Link Commentsphere to Support Non-Linear Video Access'; Matin Yarmand, Dongwook Yoon, Samuel Dodson, Ido Roll and Sidney S. Fels, '"Can You Believe [1:21]?!": Content and Time-Based Reference Patterns in Video Comments', in *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems, CHI '19* (New York: Association for Computing Machinery, 2019), 1–12.

Figure 12.1 Five examples of ASCII-/Unicode-art players as they appear in a dataset of TCCs on YouTube videos of pop music. Screenshots of the comment in situ show a variety of base player styles, likely copy-pasted by the user and adjusted to reflect the playing time and title of the parent video.

aestheticemoji.com and cutesymbols.net for easy copy-pasting by users. Along with their liberal use of emoji, non-Latin alphabets and extended character sets from the Unicode standard, these comments are allied not only with 2010-era Tumblr and Myspace content but also its contemporary revival in the 'Aesthetic aesthetic' elsewhere online. These skeuomorphic sketches, echoes of other devices growing obsolete, aspire towards a greater freedom of user expression within the constraints of the YouTube commentsphere, which these other more freewheeling platforms stand for.

Overlong Time Codes

Interestingly, a small number of TCCs contain time codes in which the detected timestamp exceeds the total duration of the video. These TCCs usually encompass deliberate trolling, where users use timestamps in excess of the playing time of the video to promise aggravating or titillating content, for example: 'OMG 3:58 made me cryyyy' (on a music video with duration 3:57), 'Justin's face at 3:46 :D SOOO FUNNY' (duration, 3:39) or 'the best part was at 5:32' (duration 3:36). This TCC type also includes the use of ranges to cover the whole running time,

as in 'My favorite part is 0:00 -> 4:27' (several commenters on several videos); here, the intent is harder to discern since the comment could be construed as a sarcastic imitation of users who post such comments sincerely, or as a genuine expression of approval for the whole track. We have already discussed the use of timestamps and date stamps in listening-log TCCs, which are incorrectly presented as clickable deeplinks to users. Analogously, the dataset contains a considerable amount of irrelevant or 'spam' comments, some containing multiple references to religious texts: biblical citations to chapter and verse also resemble time codes and are also incorrectly converted to clickable TCCs by YouTube's platform.

Towards the Future: Challenges for Research with TCCs

Participants in mainstream social media platforms are lately not just users but what Axel Bruns calls 'produsers', whose digital labour is captured, repackaged and resold as behavioural, social, political or commercial insight.[20] Researchers, in industry and academia, aim to extract valuable information from such loosely structured user-generated content, including, but not limited to, YouTube comments. This data can then be used to improve multimedia retrieval systems – for example, search engines, recommendation engines, playlisting services – by attempting to integrate the preferences expressed by users in these comments into the criteria used to rank and promote content on the platform.[21] This is the background to cultural studies' interest in the same data; as Richard Rogers argues, it is useful to appropriate some of the techniques of commerce and industry to analyse cultural data at scale.[22]

However, these techniques have their limitations, which manifest even in a cursory analysis of TCCs. Difficult or unruly user data – such as the 0:00 comments, overlong or otherwise invalid TCCs – should not be excluded from

[20] Axel Bruns, 'From Prosumer to Produser: Understanding User-Led Content Creation', *Transforming Audiences 2009*, 2009, https://eprints.qut.edu.au/27370/.

[21] See, for example, Stefan Siersdorfer, Sergiu Chelaru, Wolfgang Nejdl and Jose San Pedro, 'How Useful Are Your Comments?: Analyzing and Predicting YouTube Comments and Comment Ratings', *Proceedings of the 19th International Conference on World Wide Web, WWW '10* (New York: ACM, 2010), 891–900; Julio Savigny and Ayu Purwarianti, 'Emotion Classification on YouTube Comments Using Word Embedding', in *2017 International Conference on Advanced Informatics, Concepts, Theory, and Applications (ICAICTA)* (2017), 1–5; Aliaksei Severyn, Alessandro Moschitti, Olga Uryupina, Barbara Plank and Katja Filippova, 'Multi-Lingual Opinion Mining on YouTube', *Information Processing & Management* 52, no. 1 (January 2016): 46–60.

[22] Richard Rogers, *Digital Methods* (Cambridge, MA: The MIT Press, 2013).

analysis simply because they cannot easily be synchronized to the time-based media to which they are related: they are only malformed with regard to a particular end. Deliberate and subversive attempts to troll other users by using intentionally opaque or invalid time codes, as well as the incorrect detection of time code-like citations throughout the platform, confound such ready algorithmic extraction of these data, by both industrial researchers and, perhaps ironically, academic researchers.

YouTube, like other Alphabet online properties, continued to host scores of user tests, in which new user interfaces are tested on website users.[23] One such test, which went live in October 2021, trialled the introduction of a graph-like visualization of the most rewatched video segments, called 'Heatseeker'.[24] Another experiment, which graduated to a full feature, extracted time-coded data from video descriptions to derive clickable video 'chapters', another feature proven to be popular with users and the platform owners, since they enable subsections of longer videos to appear in search results in the Alphabet-owned Google internet search property, further fragmenting the audiovisual object.[25] However, it seems at the time of writing that user comments containing TCCs that delineate these segments, or offer alternative parsings of the parent video, are ignored – if they exist at all. The only approved non-linear paths through video media are those provided by the video author or the uploading user, while user-generated alternatives are condemned to the comments section. As with the abolition of YouTube annotations (completed in 2019), the site's owners are evidently ambivalent about the promise of user-generated hypertext, leaving TCCs in the comment section as the only means to project users' dreams for the time-critical futures of the platform.

Some of the antinomies of working with TCCs are inherited from the attitudes to and problems with the platform more generally. YouTube comments were viewed by respondents to a 2013 survey as not particularly reputable, relevant

[23] 'YouTube Test Features and Experiments – YouTube Community', https://support.google.com/youtube/thread/18138167/youtube-test-features-and-experiments; Noortje Marres and David Stark, 'Put to the Test: For a New Sociology of Testing', *The British Journal of Sociology* 71, no. 3 (2020): 423–43.

[24] Damien Wilde, 'YouTube UI Test Highlights 'Most Viewed' Video Portions in Playback Progress Bar Graph', *9to5Google* (blog), 11 October 2021, https://9to5google.com/2021/10/11/youtube-ui-test-highlights-most-viewed-video-portions-in-playback-progress-bar-graph/.

[25] 'YouTube Tests "Video Chapters" to Skip Through to Relevant Sections in a Video', *Social Media Today*, https://www.socialmediatoday.com/news/youtube-tests-video-chapters-to-skip-through-to-relevant-sections-in-a-vi/576048/; 'YouTube Makes Video Chapters Official, Helping You Skip to the Parts That Matter', *Android Police* (blog), 29 May 2020, https://www.androidpolice.com/2020/05/29/youtube-is-rolling-out-video-chapters-to-help-you-skip-to-the-parts-that-matter/.

or essential to the viewing experience.[26] Despite this, they remain relatively popular: about 12 per cent of viewers will leave comments under a given video, while over half of their survey respondents agreed that they often read the first one or two comments after watching a YouTube video.[27] Studies drawing on YouTube data that claim some representativeness significantly risk overstating the musical preferences of a self-selecting cohort of online commenters. Patricia Lange sounded the alarm early in the history of the site, observing that 'it is a synchronically-laden categorisation to seek a person who posts videos on YouTube, and assume that they were, are, and always will be "ordinary"'.[28] Lange was thinking primarily of users who post videos, though much the same goes for commenters.

Worse, recent research shows that the specific implementation of the comment section has led to the contagion of racial antagonisms inside and across videos at the 'meso' level of the social network.[29] Racism – and, by extension, other harms – in the YouTube comments section ought not to be characterized as exceptional and sporadic incivility, trolling or flaming; rather, as Dhiraj Murthy and Sanjay Sharma argue, 'online hostility' is 'a networked phenomenon' that predates the Web.[30] Indeed, comment sections were the focus of policy changes by YouTube designed to protect children from exploitative, predatory and sexualizing behaviour, concerns about which first surfaced around the same time as the Elsagate controversy in 2017 but were only heeded two years later, as large advertisers began to terminate their relationships with YouTube.[31] TCCs can facilitate the spread of objectionable and harmful material under musical guises, a problem with (but hardly specific to) recorded dance performances by Black YouTube users, flagged up for quite some time now by Kyra Gaunt.[32]

[26] Peter Schultes, Verena Dorner and Franz Lehner, 'Leave a Comment! An In-Depth Analysis of User Comments on YouTube', in *Wirtschaftsinformatik Proceedings 2013* 42 (11th International Conference on Wirtschaftsinformatik, Leipzig, 2013), 659.

[27] Ibid., 660.

[28] Patricia G. Lange, '(Mis)Conceptions about YouTube', in *Video Vortex Reader: Responses to YouTube*, ed. Geert Lovink and Sabine Niederer (Amsterdam: Institute of Network Cultures, 2008), 90.

[29] Dhiraj Murthy and Sanjay Sharma, 'Visualizing YouTube's Comment Space: Online Hostility as a Networked Phenomena', *New Media & Society* 21, no. 1 (January 2019): 209.

[30] Ibid., 193.

[31] 'YouTube Bans Comments on All Videos of Children', *BBC News*, 28 February 2019, https://www.bbc.com/news/technology-47408969; 'The Disturbing YouTube Videos That Are Tricking Children', *BBC News*, 26 March 2017, https://www.bbc.com/news/blogs-trending-39381889; 'Nestle, Disney Pull YouTube Ads, Joining Furor Over Child Videos', *Bloomberg.com*, 20 February 2019, https://www.bloomberg.com/news/articles/2019-02-20/disney-pulls-youtube-ads-amid-concerns-over-child-video-voyeurs.

[32] Kyra D. Gaunt, 'YouTube, Twerking & You: Context Collapse and the Handheld Co-Presence of Black Girls and Miley Cyrus', *Journal of Popular Music Studies* 27, no. 3 (September 2015): 244–73;

These serious issues with content aside, access issues also proliferate: YouTube data is proprietary data, which is regulated not only by terms of service agreements but also by a nest of national and international legislation that has tended to favour the rights of the owners of the Web property on which the data is made available. In late 2020, related to the policy changes described above, the comment section on likely millions of audio-only videos (so-called Art Tracks) was disabled; undisclosed millions of comments were lost and, with them, valued fan feedback – much to the vocal frustration of small artists.[33] Additionally, although the latest version of the YouTube Data API allows the mass retrieval of comments by technical and semi-technical researchers and quota is relatively generous, the number of requests required to paginate through millions of comments and their replies means that costly quota increases are necessary at the scale required to retrieve and filter TCCs. For this reason, researchers may prefer to use non-official means to retrieve comments (including the popular youtube-dl package and its derivatives), which have the added advantage of insuring against a potential post-API future, in which authorized access to YouTube comment data may be withdrawn.[34]

Conclusion

Keeping these challenges of working with TCCs in mind, the future for research into the narrower domain of music and music videos with TCCs is relatively bright, once data is generated from careful and equitable comment curation, collection and preservation efforts. Future research might examine the role of YouTube TCCs and their associated memes in canon formation in online-first music cultures and, relatedly, language change in references to music more generally. TCCs have the capacity to pinpoint the appearance of new music production practices as well as the circulation of samples and Track IDs, which are often identified by fans shortly after the release of new tracks online and in

Kyra D. Gaunt, 'The Disclosure, Disconnect, and Digital Sexploitation of Tween Girls' Aspirational YouTube Videos', *Journal of Black Sexuality and Relationships* 5, no. 1 (2018): 91–132.

[33] 'YouTube Mass Disables All Comments on "Art Track" Music Videos', *Reclaim The Net* (blog), 18 December 2020, https://reclaimthenet.org/youtube-mass-disables-comments-art-track-music-videos/.

[34] Deen Freelon, 'Computational Research in the Post-API Age', *Political Communication* 35, no. 4 (October 2018): 665–8; Axel Bruns, 'After the "APIcalypse": Social Media Platforms and Their Fight Against Critical Scholarly Research', *Information, Communication & Society* 22, no. 11 (September 2019): 1544–66.

advance of their analysis by critics or other writers. Academic music theorists have lately taken an interest in the transmission of music theory online; because TCCs enable references to music without the mediation of notation, viewers and content creators can use them to structure their listening *en route* to written musical literacy.[35] There is also the possibility that phenomena described by music psychologists, such as chills, earworms and music-evoked autobiographical memories (MEAMs) can benefit from the extension of laboratory studies using more naturalistic data as it occurs on social listening platforms.[36] And, most speculatively, there is the capacity for a large-scale study of TCCs to reveal historic shifts in listening practices over the last two decades, as notions of the ownership of digital media are put at stake through the rise of streaming and in reactions against the same that are palpable in counterhegemonic musical niches that carve out their presence online nonetheless.

Perhaps the most promising technological development is the recent peak in interest in so-called neural or semantic search technology. Clustering and retrieval of similar documents can be completed with minimal human labelling ('supervision') and few assumptions about the linguistic structure of the claims represented in the data. This innovation allows for non-verbal text – including time codes, Unicode art and emoji – to influence which comments are considered similar to each other as well as sophisticated multilingual models. Images, audio and even video can be used alongside or instead of text to specify a query over the index of stored social media. This will supplement or even entirely replace text-based modes of analysis that require researchers to articulate their interests as textual search queries. This inaugurates a move towards a more multidimensional and multimodal exploration of social media, that is thus more free-associative.

This comports with the rejection of the extractive attitude towards online texts that some of their less normative uses of TCCs engender, yet further calling attention to the fact that the claims that online comments make about the media to which they refer are mediated by the technologies with which they

[35] See the many contributions engaging with YouTube at the recent Society for Music Analysis study day 'Teaching Music Theory In The Digital Age', convened by Kenneth Smith and John Moore (University of Liverpool), which was held online on Friday, 26 March 2021, https://www.sma.ac.uk/2021/03/teaching-music-theory-in-the-digital-age-2/.

[36] Lassi A. Liikkanen, Kelly Jakubowski and Jukka M. Toivanen, 'Catching Earworms on Twitter', *Music Perception* 33, no. 2 (December 2015): 199–216. See also, for example, Kelly Jakubowski and Anita Ghosh, 'Music-Evoked Autobiographical Memories in Everyday Life', *Psychology of Music* 49, no. 3 (May 2021): 649–66; Scott Bannister, 'Distinct Varieties of Aesthetic Chills in Response to Multimedia', *PLoS ONE* 14, no. 11 (November 2019): e0224974.

are articulated. The framing analytic of Adorno's study of fan mail thus remains oddly durable for twenty-first-century streaming media platforms. What's needed, then, is less new theory and more new technique to acquire and process the relevant data. A final challenge to researchers interested in exploring this phenomenon further: the openness of TCCs, and that of online social media texts about music in general, is significant – relative to Adorno's data – but may be fleeting and is certainly ever-changing. It is therefore important to move quickly, in an environment when online texts that are rich in cultural–technical detail risk enclosure or, worse, complete withdrawal from circulation.

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