

Research Methods 2.0: doing research using virtual communities

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Virtual Communities as a resource for research

Virtual communities offer an unprecedented access to new forms of primary data in many fields of inquiry. In particular, user generated content on sites such as YouTube, Facebook and MySpace provides primary data both about topics of interest to users of those sites as well as the responses of the online community to the posted content. For example, shortly after the launch of the iPhone 3G, there were literally thousands of video clips uploaded to YouTube that offered demos and reviews of the new product (Blythe & Cairns, 2009). Additionally, many people posted comments and ratings about these videos. Such materials could provide a rich resource both in researching the community of people who buy or use the iPhone 3G and in the design of future products.

However, both the quality and the quantity of the available data offer substantial obstacles to existing research methods and therefore bring into question the value of research based on this data. Additionally, the very dynamic nature of user generated content sites makes it impossible to be exhaustive and presents something of a moving target to the researcher.

In this chapter, we consider how existing quantitative and qualitative methods may be applied to researching the primary data offered by virtual communities. Specifically we focus on analysing YouTube content and we discuss how different methods apply, what their limitations are in this context and how those limitations may be overcome through adaptations of the method or even new methods.

The existing methods considered are statistical analysis, content analysis and grounded theory. These methods are not just used to study the virtual community embodied in YouTube but also people's relationships with technology as reflected in the videos and their associated

comments. It becomes clear that each method has something to say about understanding YouTube content and could say more if developed for this sort of data.

What is also clear, though, is that in some sense these methods miss some of the key sociological phenomena around the videos. In previous work (*ibid*), we found that the most popular video related to the iPhone 3G was the “Will it Blend?” video where an iPhone 3G is blended to dust in a parody drawing on 1960’s gameshows and scientific documentaries amongst other things. The sheer numbers of people viewing this video and commenting on it, more than 2.5 million and 10,000 respectively, shows that this video has an enormous impact but being a single video, it is hard to use existing research methods to account for this impact.

Critical theory is being increasingly used in HCI [e.g. Bell et al 2003, Bertlson and Pold 2004, Sengers et al 2005 De Souza 2005, Blythe et al 2007 Satchell 2008] and offers researchers the opportunity to analyse cultural artefacts to provide insight into the social and cultural phenomena . In this chapter, we offer an introduction to critical theory and suggest a method for applying it to the study of user generated content.

In order to demonstrate the methods being discussed in this chapter, we have used a videogame, *The Shadow of the Colossus* (Sony, 2006), as the focus of our research. This is in part because videogames present a significant cultural phenomenon and area of substantial research interest (eg Juul, 2005) and because this particular game, having been released in 2005/2006 is relatively old and so presents something of a more stable topic for study and for applying the different research methods. We are therefore not considering in this chapter the particular challenges presented by rapidly emerging and evolving topics such as those related to game or product launches or as a consequence of news stories. (For example, at the time of writing, it is less than 24 hours since a plane crash-landed in the Hudson river without loss of life and there are several hundred uploaded videos on YouTube and no doubt many more before this chapter is finished).

The Shadow of the Colossus

The Shadow of the Colossus was released in 2005 in Asia and the US and elsewhere in 2006 (Wikipedia, 2009a). The game involves the character, Wander, controlled by the player who must slay 16 colossi, enormous creatures that inhabit a beautiful, yet deserted, land populated, except for the colossi, by only a few birds and animals. There is also an implicit backstory to the events of the game that unfolds during the course of the game and a substantial end sequence. This makes the game different from many others in that there is no persistent action in the game: much of the activity of the player is riding Wander's horse, Agro, through this empty landscape to find the next colossus. The game was intended to (and does) feel like, 16 "boss" levels of a more traditional game but with no ordinary levels in between. Indeed because a colossus presents a seemingly impossible challenge to Wander the contrast between the intensity of fighting and the relaxed, occasionally aimless, searching for the colossus is all the more marked.

The production values of the game are high: there is excellent rendering of the landscape and the colossi; powerful third-person perspective that, through, camera shakes and blurs, adds to the impression of size and power of the colossi; and an unobtrusive yet atmospheric soundtrack that only plays during encounters with a colossus.

It sold well having had widely popular viral marketing campaign (Pspimp, 2009) and also building on the cult success of *Ico*, a previous release by the same developers. It also received many awards including ones for its artwork, music and overall design (Wikipedia, 2009a).

The search was done in YouTube by using the search term "Shadow of the Colossus." It is immediately clear that an important subset of the videos returned are clips showing "speed runs" where a player has managed to kill a colossus in impressively quick times. These use the timed attack feature that is unlocked when players complete the game. To look at the relationship between a subsample of video clips constituting part of a larger sample, the secondary search term "Shadow of the Colossus Timed Attack" was used. Also, to see changes over time, each search was done at two distinct points. The first term was searched twice on 26th September, 2008 and 16th January, 2009. The second term was searched twice on 29th September, 2008 and 16th January, 2009.

YouTube by the numbers

It is possible to gather and analyse a vast amount of quantitative data from YouTube. The purpose here is not to provide an exhaustive analysis but rather to show how statistical methods could be applied to YouTube. The analysis done here clearly shows that we need to move away from the usual statistical realm of means, standard deviations and t-tests. Instead, it is necessary to think in terms of new types of distributions and use models to provide descriptions of YouTube quantitative data that allow us to see differences and changes in the use of YouTube and hence what its content can tell us about its community.

Gathering quantitative data

Like many virtual communities, the YouTube site is awash with information be it links to other content, statistics about the particular page or comments by members of the community. Specifically, there are many numbers that are easy to obtain such as how many times a video has been viewed, *viz* view count, the number of comments made on a video and the average rating of a video (1 to 5 stars) and the number of ratings that have been made. With a “scraper” (Cha, Kwak, Rodriguez et al, 2007) it is easy to compile even more numbers based on the complex network of links between YouTube subscribers, the videos and the commenters. However, as very few papers use or analyse any of these numbers, we focus here on those most easily obtained.

Whilst it is easy to get a view count, even such an apparently straightforward number needs to be questioned. In a search result, each thumbnail for the found videos has next to it a view count along with when the video was uploaded and its rating. However, on viewing a found video, the view count figure can be somewhat different. For instance at the time of writing, the search term “Braid” (a recent and highly rated videogame) returned the clip “Braid into gameplay” (<http://uk.youtube.com/watch?v=br3Oo1g9nZQ>) as the first returned hit. The thumbnail viewcount was 51,412 but on the page with the video the view count was 51,562. This is a small discrepancy but it does beg the question of where these different numbers are coming from. Also, this does not seem to be a difference due to numbers of viewings between getting the search results and hitting the page as refreshing the search page having cleared all browsing history does not now produce the larger figure. On the whole, it seems that search results view counts are always of the order of a few hundred lower than the figures given on the video page itself.

Additionally, YouTube will happily proclaim a huge number of hits for a given topic. A search for “Shadow of the Colossus” on 16th January, 2009, was said to have about 3,310 hits but if you go through each page of search results, the results usually peter out after a few hundred, in this case 349. After that, the pages return to the first search results. Of course it could be that this initial hit estimate is wildly inaccurate but it seems unhelpfully wrong. And as will be seen, it seems likely that there are further videos but they are simply not being returned.

Looking at view counts

As YouTube is all about viewing videos, the view count data seems a good place to start to understand the community that uses YouTube, in particular what they view and how that viewing profile changes. The search term “Shadow of the Colossus” was said to have 2720 hits on 29th September, 2008 and 3,310 at the later date but of these 366 were accessible on the first occasion but only 349 on the second. Where the previously accessible videos had gone can only be a matter for speculation.

When videos are ranked by view count, it is clear that the view count drops off extremely rapidly with rank. This is shown in Figure 1a and a good example of this is the most viewed video was viewed just over 395,000 times whereas the 20th most viewed was seen fewer than 80,000 times. With this sort of distribution, it is usual to take a log-log plot of view count against rank. This greatly reduces the numbers, particularly large numbers, but also a commonly found distribution is the Zipf distribution where the frequency or size of an object is in a power law relationship with its ranks. So in this case, a Zipf distribution would be that the view count, v , is proportional to some power of the ranking, k . This is expressed as:

$$v = a.k^{-s}$$

This distribution has been found to occur in many situations from word frequency, city sizes (Zipf, 1949), website popularity and website links (Adamic & Huberman, 2002).

On a log-log plot, the Zipf distribution produces a straight line with gradient $-s$ so is particularly easy to identify. However, as can be seen in Figure 1b, the log-log plot of view count against rank, though initially linear is clearly deviating from linear at the point at which the data runs out.

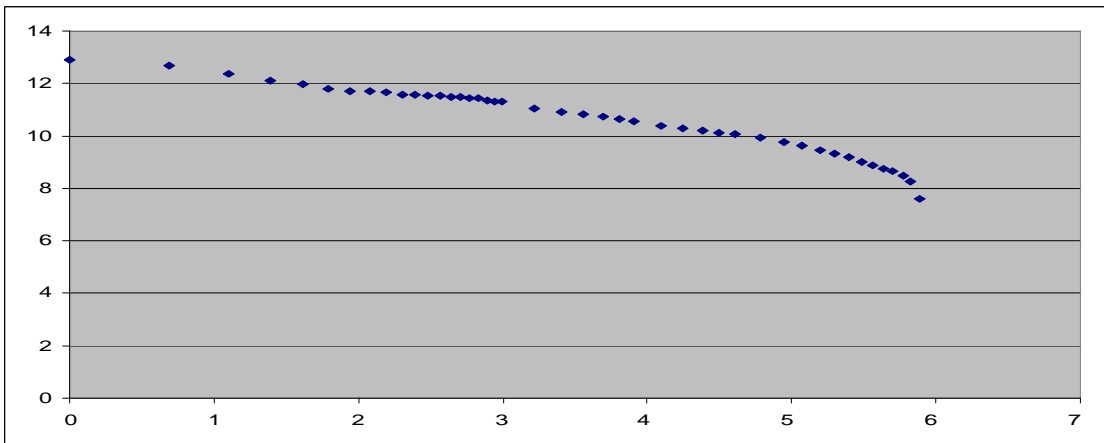
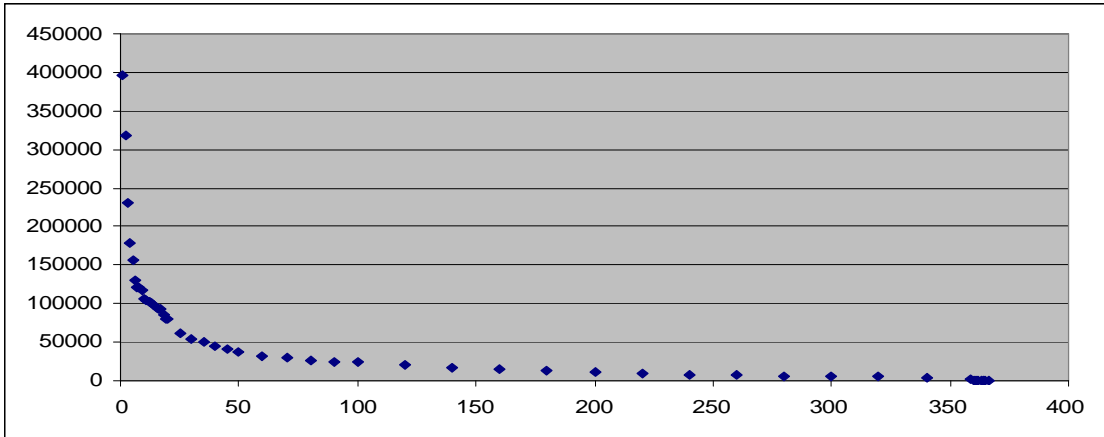


Figure 1. (a) A plot of view count against ranking for videos retrieved for “Shadow of the Colossus” on 26th Sept, 08 (b) A log-log plot of the same data.

This “knee” in the data is more clearly seen in the smaller sample retrieved for “Shadow of the Colossus Timed Attack,” see Figure 2, and also for the later search on the same term.

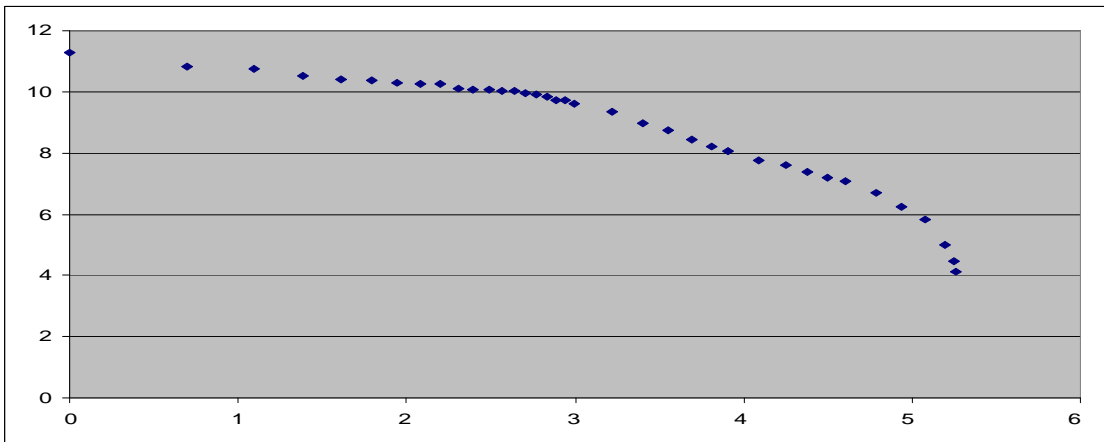


Figure 2. A log-log plot of view count against rankings for videos for “Shadow of the Colossus Timed Attack” on 29th Sept, 08.

This deviation from a Zipf distribution in YouTube view counts has been seen before when looking at very large samples of YouTube that have been scraped from the site by following links within the site, rather than looking at the hits for a particular search [Cha et al, 2007; Cheng , Dale & Liu, 2007]. It is noteworthy that the same feature appears in this quite different context but also that when samples are taken a different way, namely through looking at the videos viewed on a particular campus, this feature is absent and the view counts follow a Zipf distribution.

From parameters to models

Statistical analysis of course goes beyond simply presenting a description of the data collected (though this is of course useful). Rather with the use of inferential techniques it is possible to quantify the nature of the underlying populations and so make predictions about future behaviour or other samples. Thus these techniques allow a researcher to ask questions about whether particular samples are different from other samples or differ in behaviour from underlying populations from which the samples are drawn. For example, do the Timed Attack view counts reflect a different usage of those videos from the more general “Shadow of the Colossus” videos? Or knowing that this is a dynamic resource, is it possible to discern the growth of the numbers of videos on these topics from the instantaneous snapshots taken?

The key to answering these questions is being able to provide a generic account of how the underlying distributions behave. In the case of parametric statistics, the typical tests, namely t-tests and ANOVAs, use knowledge of the underlying normal distribution to see whether apparent differences in sample means can be attributed to chance or are due to some underlying influence affecting the samples differently. This equates to determining whether the parameters of the normal distributions underlying the samples, viz the means, actually differ. The data gathered on view counts though is clearly not normally distributed so these approaches will not work.

What is needed to achieve the same ability is to be able to determine the parameters of the underlying populations from which the samples are drawn. Had the data followed a straight line in the log-log plot, it would be natural to assume that the data followed a Zipf distribution

which is entirely characterised by the exponent, s , in the equation above (a is also a parameter but basically reflects the number of people viewing the highest ranked item so is not as important in determining the underlying distribution). Moreover, it is well known that the Zipf distribution arises naturally in a process called the Yule-Simon process (Wikipedia 2009b). This process can be abstracted to a situation where there are urns with balls in them (a favourite scenario of mathematicians) and balls are added to the urns or more urns are added to the collection. To produce a Zipf distribution, there is a large number of turns. On each turn either a new ball is added to a chosen urn or a new urn with one ball in it is added. In the first case, the urn is chosen at random but the probability of a particular urn being chosen is in proportion to the number of balls already in the urn. This is characterised as “the rich get richer.” Whether a ball is added to an existing urn or a new urn is added is also a random process where the probability of adding a new urn is usually quite small. After many turns, the numbers of balls in the urns follow a Zipf distribution for the majority of the urns, in particular in the lower ranking urns.

Thus, knowing what the distribution ought to be not only gives the power to determine the parameters of the distribution but also provides a process by which that distribution arose. Clearly then, the Yule-Simon process is *not* driving the viewing of YouTube videos despite the intuitive appeal of the “rich get richer” scenario together with a steady, probabilistic rate of growth, at least for specific search results like “Shadow of the Colossus.”

There are of course other distributions that are able to account for the knee observed here. Cheng, Dale and Liu (2007) proposed Weibull and Gamma distributions as possible though still imprecise better fits for the data. These correspond to a stretched exponential distribution (Guo, Tan, Chen et al., 2008) or a summed exponential distribution. Cha et al.(2007) account for the knee with a Zipf law followed by an exponential cutoff. They offer reasons for this cutoff but there is no empirical support for these reasons. So in general, there is no explanation of why the processes underlying these distributions account for the observed data. Also, it should be noted that these papers consider large sections of all YouTube content and do not necessarily account for how particular search topics change. For instance, it is apparent that some topics, such as those being considered here, will fade in popularity over time and therefore by comparison to other videos. This will affect the overall shape of the view counts away from a Zipf distribution. However, if a person has entered a particular search term then that shows an interest in that topic over and above other topics and hence whilst the rate of viewing and the rate of contributing new

videos may decrease with time, this does not account for the deviations from a Zipf distribution *within* that topic.

Considerations of this sort may also account for Gill, Arlitt, Li et al.'s (2008) findings that viewings of YouTube videos on a particular campus do follow a Zipf law. The data was collected only over 85 days and the most popular video was only viewed around 1000 times suggesting at most 1000 users viewed that video. Thus, the opportunity for changes in popularity was less when compared with YouTube as a whole or for a topic that has been present on YouTube for at least two or three years. Also, with a campus offering the opportunity for vectors of communication between viewers (other than YouTube itself) combined with relatively small numbers of viewers, it is possible that the Yule-Simon process is a good underlying process for the viewing of videos in this context.

Thus, whilst it is nice to be able to put a name to an underlying distribution for view counts, there is always the risk that this is just fitting the data and there is no good reason for the distribution to be one shape rather than another similar one. We would hold that it is much more useful if the underlying distribution can be supported by a model or process that indicates why this viewing behaviour arose and so we turn to this next.

Modelling view counts

The Yule-Simon process clearly has key aspects that seem suitable for YouTube viewing behaviour. Search results in YouTube are weighted towards highly viewed videos and also, using sorting by view count, viewers can start with those most highly viewed very easily. This promotes a rich gets richer attitude of the Yule-Simon process. Also, it is clear that videos are added to cover current topics and this matches the growth aspect of the Yule-Simon process however clearly the two features are not as balanced in view counts as they are in the ideal Yule-Simon process.

Thus, we assume that the underlying general behaviour of the rich getting richer does generally apply when it comes to viewing YouTube data but that the growth of videos on a given topic is not in the right balance for the Yule-Simon process. Java was used to implement a model of a collection of YouTube videos that were viewed on a rich gets richer basis. That is, there was always the possibility of any of the videos being viewed but that possibility was in proportion to how many times it had already been viewed. The model was used to vary the way in which the

underlying collection grew to see which variations produced the observed “knee” in the view counts. Parameters that could be varied within a given model were the number of videos in the collection, the rate of growth and the proportion in which “rich” videos got richer, that is, whether a video getting a viewing resulted in only one further view or multiple views before another video was viewed. This parameter we have called the view increment.

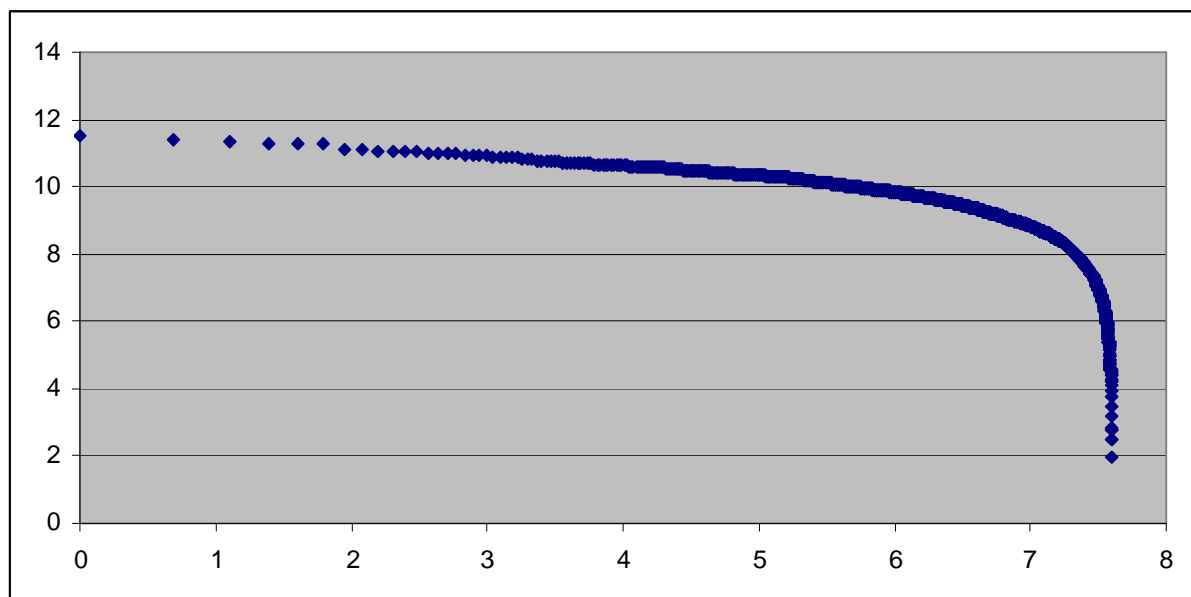


Figure 3. A log-log plot of view counts ranking for a model of two thousand videos on a rich get richer basis but without any growth in the number of videos.

The most extreme case would be as in a very old topic (in YouTube terms) where a topic is still being extensively viewed but there are no new videos. In reality, it is not clear that there are any such topics. There are certainly old videos, such as the electric guitar performance of Pachelbel’s Canon (<http://www.youtube.com/watch?v=QjA5faZF1A8>) which is still being viewed and commented on despite having been uploaded since more or less the beginning of YouTube. However, a search for this topic shows that videos are still being uploaded that match the search term

When modelling this unrealistic extreme, for a range of video collection sizes and view increments, the resulting view counts took on a generally uniform shape, for example as seen in Figure 3. However, what is noticeable is that the overall shape of the curve is quite flat in the

log-log plot until the point at which view counts drop off. This is quite encouraging as it produces the distinctive knee seen in the real data but is not realistic in terms of how real videos are viewed.

With growth in videos as modelled by the Yule-Simon process (the other extreme), our model produces the expected straight line in the log-log plot. Thus something between regular growth and no growth must be happening. Exactly what is happening could only be found by some form of extensive and detailed longitudinal observation but using these simplistic models it is possible to see how different patterns of growth might affect overall view counts.

A simple model would be to imagine that the initial growth is initially so rapid that, in effect, there is a whole set of videos available to watch from the outset but that after that growth is only extremely slow. It is not clear that this is realistic but certainly the rate at which videos appear for a new topic is extremely rapid (Blythe & Cairns, 2009) but whether it is quite so rapid in proportion to viewing is not clear. Nonetheless, the results from this sort of viewing process are seen in Figure 4. The graph has the clear knee but there is also a “scree” effect where the drop off in the tail begins to level out again. Unfortunately this data on how the very end of the tail behaves is precisely what is missing from YouTube.

Another more plausible model is that initially there is a steady growth in videos but that at some point this tails off though viewing still continues at a modest rate. How the growth of videos on a topic changes is entirely unknown and so it would be pointless to try to provide a detailed description of how the growth tails off. Thus, we have used a very crude model where after the video collection reaches a certain size, no new videos are added.

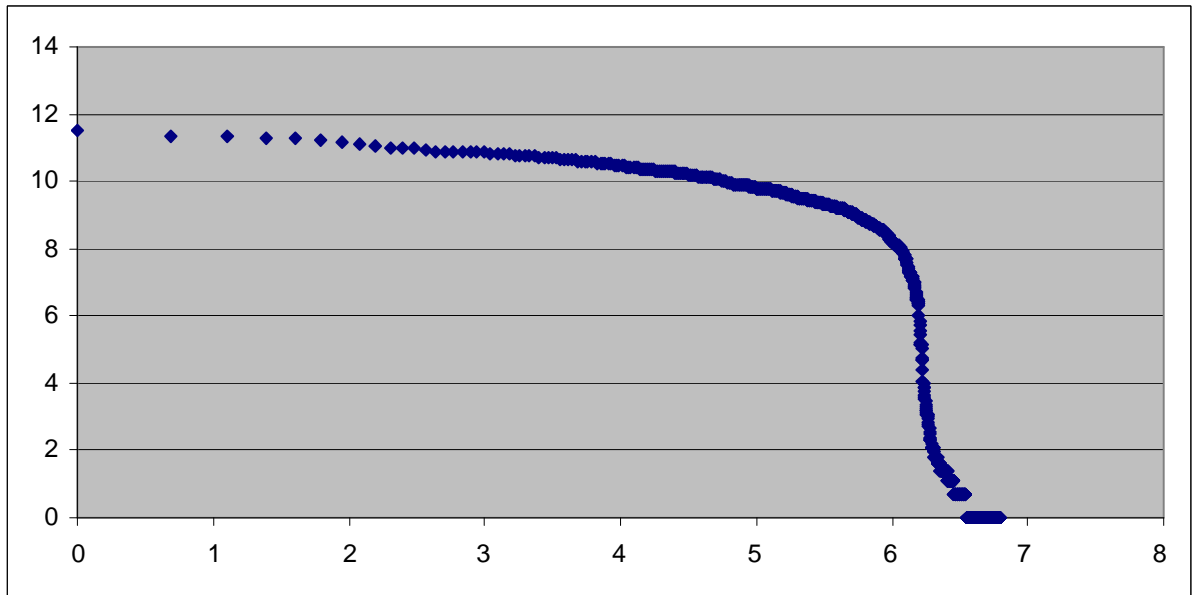


Figure 4. Log-log plot of view count against ranking for a model with initially 500 videos and a growth rate of 5 new videos every 100,000 viewings.

For a video collection whose growth is capped at 2000 videos and the initial growth rate is high, the model does produce view counts very similar to those seen in YouTube. There is both a pronounced knee in the log-log plot and by varying the initial growth rate, it is possible to vary the plot from anything between a straight line to that seen in Figure 5. Of course, the initial growth rate is very high, one new video for every 5 viewings on average, but the capping suddenly stops the growth and it begins to develop the knee shape. However, for a real topic like iPhone3g, some sort of explosive initial growth seems reasonable whilst people compete to be the first to cover the new product in some distinctive way. Also, it seems reasonable that this initial excitement to upload videos tails off. Our model reflects this without knowing the details of the tailing off.

Using the models

The different models of viewing based on a rich gets richer principle but with varying growth rates seem able to capture the features observed in the quantitative data gathered from YouTube. Thus it seems that a modified Yule-Simon process does adequately capture how

videos are viewed on YouTube. However, without good empirical knowledge of the actual growth rate and how it slows over time, the models are at best qualitative.

In addition, the models differ in how the tail of the distribution behaves which has already been observed as a crucial feature elsewhere (Cha et al., 2007) but it is precisely the behaviour of the tail that is missing from the data provided by YouTube.

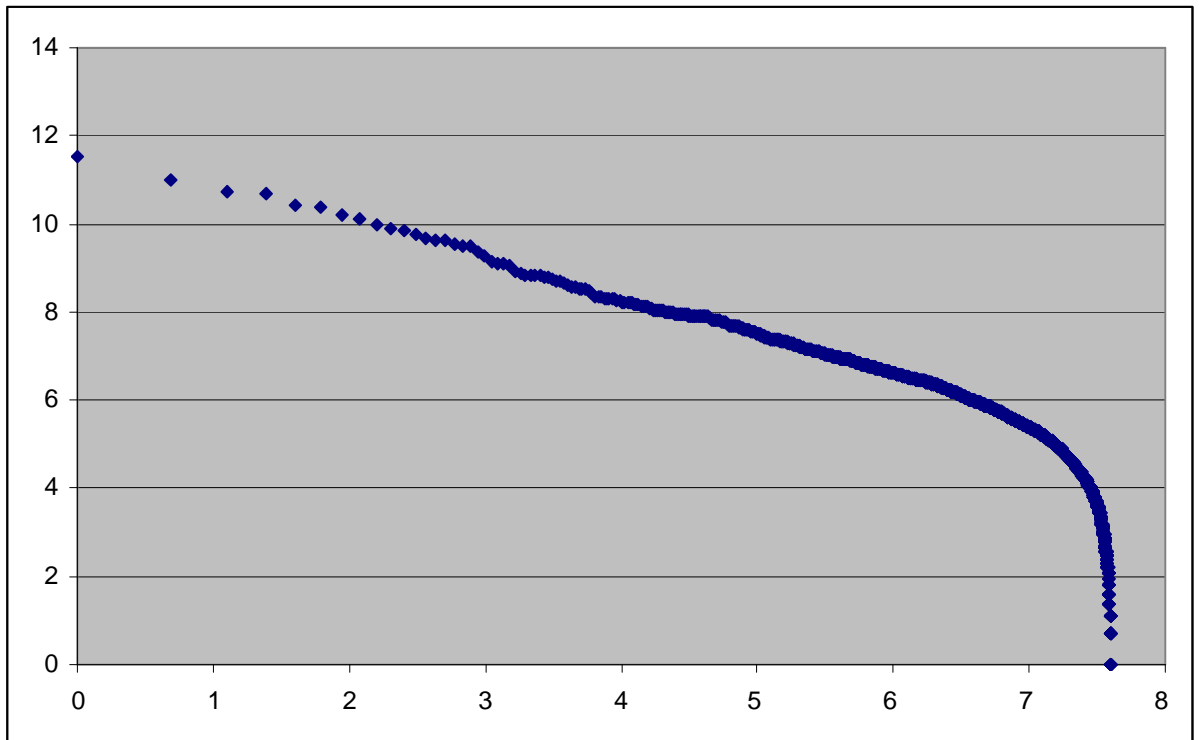


Figure 5. Log-log plot of view counts against ranking for a model where the growth rate is one new video for every five viewings until there are 2000 videos.

Thus, the first step in producing a good quantitative analysis of YouTube numbers is to gain better empirical knowledge of viewing behaviour. This would require a large scale analysis of topics over a long period to provide good estimates of the variety of growth rates and their tailing off. With such information, it would be straightforward to produce models like those used above to simulate the viewing behaviour and so allow deeper analysis. In fact, it may be that a good knowledge of the growth rates would lead to an analytic definition of the view count distributions.

Once we have good models we would then be in a position to ask key questions like: how does the growth rate vary between different topics? From a snapshot of view counts, would it be

possible to deduce some of the history of how videos had been added to the topic? And also, how representative are subtopics of the overall topic? Answers to these would provide useful insights into how YouTube reflects the changing interests of its online community. Achieving these answers may be a mix of traditional statistical analysis and further modelling using Monte Carlo techniques (simulating samples based on the models).

Of course, these models might only apply to YouTube. But the general principles seen are likely to be more generally valuable in other contexts. In the first place, good data gathering needs to be done to see what the numbers have to say about a virtual community. Then using models to understand what processes are driving the numbers and hence allow researchers to return to the data seeking the range and variation possible within the processes. Once a deep understanding of the underlying processes is gained through modelling, it should then be possible to ask questions about what is represented in the online community and how it changes and develops over time.

Content analysis

Content analysis is frequently used in studies of mass media. It is a procedure for studying textual data, where text is understood to mean any media (e.g. film, newspaper articles, advertisements). Items are coded and counted to indicate patterns and trends in data sets. A simple example of this would be counting the number of column inches in newspapers to particular stories. The method is most famously used by Noam Chomsky who has shown that western media consistently devote more column inches to the deaths of Israelis than to the deaths of Palestinians. Although such results may be controversial the method is entirely empirical (e.g. Herman and Chomsky 2008). Al Gore also used the method to great effect in *An Inconvenient Truth* when he compared the number of articles in the popular press which doubt the cause of global warming with those that doubt it in peer reviewed articles. While more than half of the popular press articles doubted whether human activity was causing global warming the percentage in peer reviewed scientific articles was zero. Again the findings may be controversial but the method is straightforward yielding quantitative results that can be compared over time. Content analysis can be applied to both quantitative and qualitative studies.

Coding data by topic is not always entirely straightforward and there may be debate over whether particular items of content fit particular categories. For example, a content analysis

might be performed on sexist imagery in advertising (Ibid). There may be some debate as to what constitutes a sexist image. Images from the fifties such as that of a husband spanking his wife for using the wrong sort of coffee (see Figure 6) are, to current enlightened eyes, quite clearly sexist.



Fig 6. A traditionally sexist advert.

Advertising standards bodies would not allow such images today and advertisers have resorted to more subtle appeals:



Fig 7. A more modern take on the sexist advert.

The image in Figure 7 is cited as an example of contemporary sexism in advertising but it is not quite as crude as the previous example perhaps more debatable. Regardless of whether the image is degrading to either sex it clearly makes an appeal at the level of gender, women like bingo don't they lads? Content analysis can proceed so long as a broad definition of the categories to be used is in place. For this reason content analysis is most frequently used in areas that are comparatively well theorised and studied. The method is very often applied in studies of the mass media where such categories as genre are well defined and there is a large body of work on which to draw.

Although YouTube is still very young the formats of many of the videos which are shown there are very much older and lots of the work in media theory can be drawn on to understand it. This does not apply to the more interactive aspects of the site such as the comments as later sections will demonstrate.

In order to get a feeling for returns on the search "shadow of the colossus" a content analysis was performed on the first one hundred most frequently viewed videos. The search was made on the 5th of February 2009 and there were approximately 674 results.

Table 1 and Figure 8 summarise the results:

Demonstration	41
Movie-clip	9
Secrets	8

Mashup	7
Soundtrack	7
Imitation	6
Little Big Planet	6
Advert	4
Glitch	4
Parody	4
Review	3
Mashinima	1

Table 1. Categorisation of videos returned for the first 100 hits on the search term “Shadow of the Colossus”

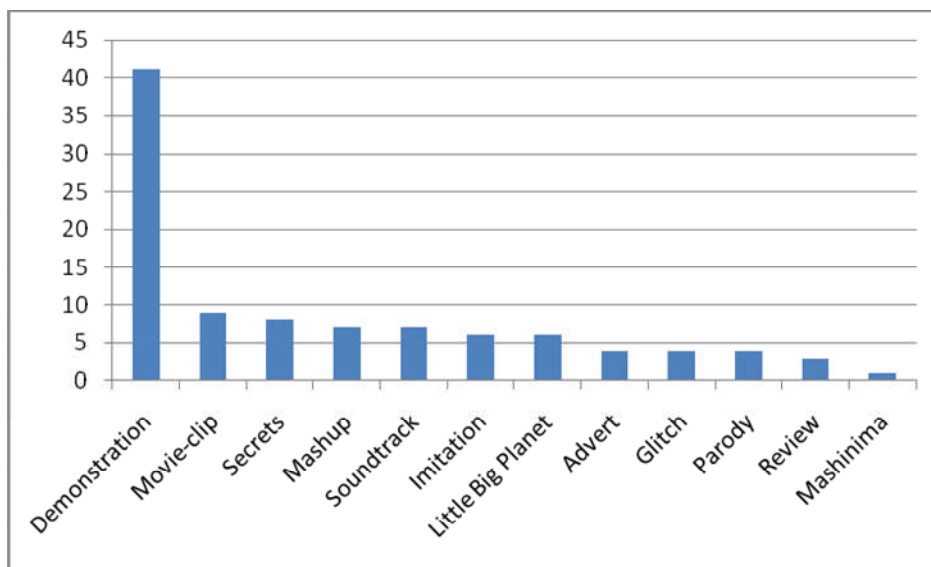


Fig 8. Bar chart of the categories of videos returned for the first 100 hits on the search term “Shadow of the Colossus”

By far the most frequent category of video was the demonstration. Here users recorded themselves playing the game either directly from the game console or by pointing a camera at the TV screen. As Shadow of the Colossus consists, essentially, of sixteen boss levels interspersed with scenic journeys, each of the battles lend themselves to a mini-movie format. Each of the sixteen colossus monsters are different and the chief interest of the videos is perhaps the spectacle of the new monster as it is revealed and then defeated. These were very popular videos, at the time of writing the “speedrun on colossus 13” had been viewed 198,095 times. The comments to such videos indicate that they are valued not only because they show off the creatures, some of which can only be seen after many hours of dedicated game play, but also

because they offer tips to other players on how to defeat them. There is both instruction and celebration in these posts.

The next most frequent return was the movie clip. This is slightly different to the demo in that it does not necessarily feature actual game play but rather clips from the non-interactive movies which players can watch upon reaching certain levels. Popular videos in this category featured the final end sequences of the game which contain plot spoilers. The “secrets” category refers to secret levels such as the way to the secret garden. The game play, movies and secrets are all in a sense demonstrations and they are separated here only to show additional detail. The three reviews could also be considered as forms of demonstration although they are more explicitly evaluative. The four Sony advertisements might also be considered a variety of demo albeit a heavily edited demonstration geared to make a particular kind of impression. Taken together the demonstrations, movie clips, secrets and reviews account for more than sixty percent of the top 100 most viewed returns.

The content in the remaining forty percent of the most viewed videos take the form of slightly less familiar media. “Mashups” and “Machinima” are relatively new forms and perhaps the most original genres to emerge in user generated content. Mashups take two existing media and combine or mash them up together e.g. a piece of music and a piece of film (Bardzell 2007). Here the youtubers typically combined footage from the game with music. Carmina Burana appears in two such mashups. In the rest the game footage is overlaid with heavy metal music. This will be returned to in later sections.

Machinima is a form of video production which uses game avatars as actors and game environments as location. Players manipulate the characters directly in the game or in post production to tell their own stories (Ibid). Often such videos are comic but not always. The video “Agro-vation!! (funny)” begins with a series of game play clips where the central character attempts to get his horse to lead the horse into places it cannot go (up sheer walls for example), subtitles present growing frustration as the horse refuses to co-operate. Eventually a subtitle appears announcing that this has got to stop and the character proceeds to kill the horse in entertaining ways (e.g. running it over a cliff). The video ends by exploiting a glitch in the game which the “glitch” videos also note. When the horse disappears he can be summoned back, by killing the horse in a particular location players exploiting the glitch can make the horse appear in mid air. This is the climax of this not terribly inspired piece of machinima.

Similar posts to this are imitations and parodies of the game. The imitations were typically made with very basic animation so that a small spot appears to attack a stick man. A live action parody features a young man with an action figure attached to his foot. He does not notice it as he walks around the house until he brushes his teeth, plucks it from the top of his head and throws it away. One well produced imitation features animation in a manga style which is a straight homage rather than parody. Some of the Little Big Planet posts use this PS3 game creation environment to make mini colossus games, these appear as part homage and part parody. Others appear completely irrelevant and it is hard to see why they are returned for this search.

The mashups, machinima, imitation, parody and glitch videos all playfully undermine the game. The parodies directly satirise the somewhat grandiose tone by juxtaposing the stirring music with knocked down graphics, line drawings, action figures, little big planet dinosaurs. The glitch category explicitly draws attention to game mechanics and these videos achieve their effects by pointing out the limits of the game architecture – the call back feature of the horse making it float in particular environments. All of these posts are in a sense outside of the game and the game world. They step back from the Colossus universe and comment on it either in imitations which are to one degree or another parodic or point up its technical or graphical shortcomings.

The posts in the soundtrack category are for the most part entirely celebratory. They feature moments from the game in which new themes in the music are introduced – “The Opened Way”, “Demise of the Ritual” “A Violent Encounter” and so on. The music to this game is one of its most popular features, indeed the most frequently viewed post for the entire search is an Eminence Orchestra performance of the “The Opened Way”. Two of these posts feature users playing the piece themselves on the piano.

To understand why this post is so popular the comments on this video will be explored in the next section. As YouTube is only three years old and the ability to comment not only on video posts of this kind but also to comment on the comments, is entirely new, a content analysis would not be so appropriate. “Grounded Theory” is a form of qualitative data analysis and one of the most popular frequently used. It begins not with pre existing categories but the data itself.

Grounded Theory

Grounded Theory was developed in the late nineteen sixties by Barney Glaser and Anselm Strauss. The two originators of the approach subsequently took it forward in different ways. Strauss wrote a book with Juliet Corbin which presented itself as a guidebook on qualitative data analysis (Strauss and Corbin 1991). This set out a quite formal approach delineating three stages in the process of conducting grounded theory: open coding, axial coding and selective coding.

Open coding describes the process whereby complex data such as interview transcripts or field note observations are summarised with single terms or two or three word phrases.

Depending on the size of the data set there may be a great many such open codes. In the next stage of the process “axial coding” relationships between the open codes are established. Similar or related codes are grouped together into a smaller number of larger meta-codes. Relationships between the resulting terms are then considered, as it were, connecting the axes. In practical terms the researcher now has a set of data which has been organised into overarching themes. At this point “selective coding” begins. This is essentially the creation of narrative introducing the axial codes and illustrating them with quotes. In the process of describing the codes and the relationships amongst them, theory is said to emerge.

The production of this book resulted in an academic spat with Glaser (e.g. Glaser 1998) Despite their emphasis on technical precision Strauss and Corbin are unclear as to how the categories generated during open coding and linked in axial coding create theory. Glaser argued that their positivist stance was inappropriate and emphasised instead the individual researcher’s creativity. Glaser’s coding procedure begins with open coding but does not include an axial stage. Rather the open coding is followed by theoretical coding. The researcher is encouraged to generate theory throughout the encounter with data, making detailed notes and memos on the fly. Further the researcher is discouraged from conducting a literature review related to the topic being studied as it might unduly influence the analysis. They are also discouraged from taping interviews or talking about the grounded theory until it is complete, praise or criticism being judged as unhelpful and distracting (Wikipedia: 2009c).

Although there are differences in orientation between the two schools they have in common a data led approach to theory. Despite disagreements between Glaser and Strauss, grounded theory has become one of the most frequently practiced form of qualitative data analysis. Practitioners of grounded theory often use the term theory very loosely. Theory here

may refer merely to a broad description or set of categories rather than a fully worked predictive schema (Charmaz 2006). The following section then is a grounded theory analysis of posts on the Eminence Orchestra video.

Eminence Orchestra

At the time of writing, “Shadow of the Colossus - Eminence Orchestra” had been viewed 510,387 times.

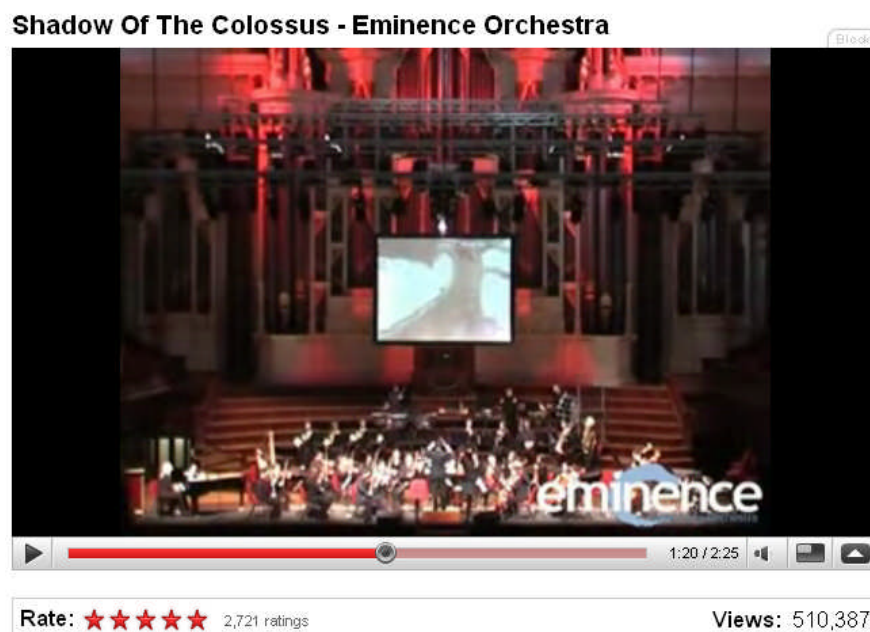


Fig 9: A still from the “Shadow of the Colossus – Eminence Orchestra”

The orchestra are dressed in black though although they are not wearing complete evening wear. The conductor wears a suit but no tie. It is a formal performance then but not entirely traditional. Above the orchestra is a large video screen showing footage from the game. As particular instruments are featured in the music the camera focuses in on the relevant section of the orchestra. As the piece builds to its climax a snare drum beats out a militaristic tattoo and the camera turns to the percussionist playing it. Although many of the most popular videos posts here showcase the music this is unusual in that it is a live performance. The “liveness” is emphasised in the attention to the individuals playing particular parts of the piece.

Not only had the post been viewed over half a million times it was also very highly rated with an average of five stars from 2721 ratings. There were also 1481 comments posted on the piece.

The all comments tab was selected and the first 250 posts were coded by copying the comment into one column of Microsoft Excel and writing an open code which summarised it in another. The data completely saturated long before the 250th comment was reached i.e. the addition of new data did not require the creation of a new code, it just slotted into one of the ones already created. The Open Codes and the frequency with which they were used are shown in the Table 2 and Figure 10.

Awe	51
Music Appreciation	28
Game Appreciation	26
Soundtrack	
Appreciation	26
Liveness	24
Music availability	23
Comparison	15
Affect	13
Criticism	13
Nostalgia for Game	10
Eminence Information	8
Game Experiences	6
Learning the music	3
Flames	2
Wishing it real	2

Table 2: Open code frequencies for comments on the “Shadow of the Colossus – Eminence Orchestra” video.

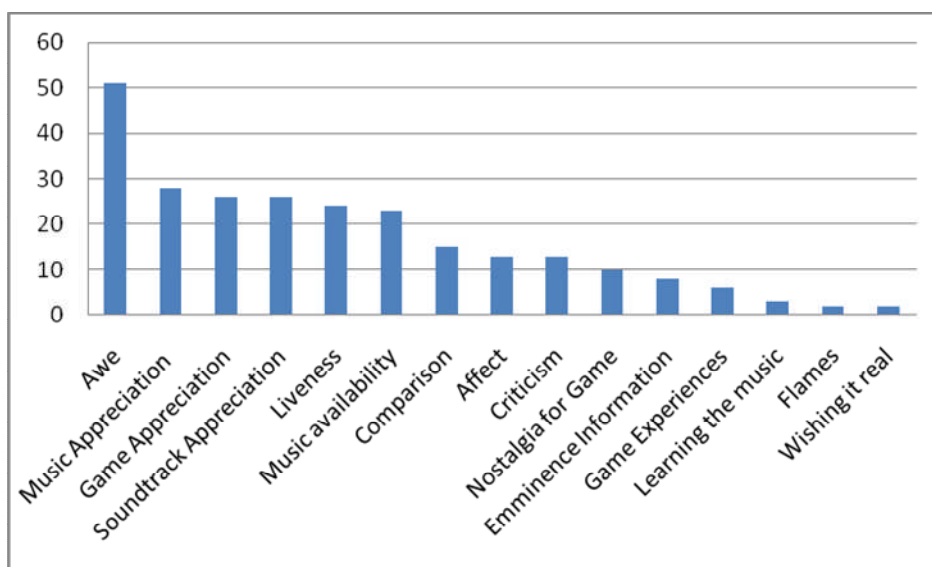


Fig 10: Barchart of the open code frequencies for comments on the “Shadow of the Colossus – Eminence Orchestra” video.

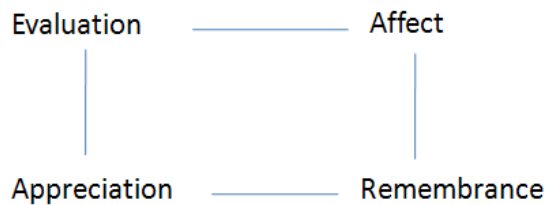
Glaser would immediately begin to theorise about these codes. Indeed it is difficult not to. For illustrative purposes the next section considers how these codes might be further categorized into axial codes.

Axial Coding

A Straussian grounded theory would take these codes and attempt to organise them. An obvious point of similarity for some of these codes is appreciation. One overarching or “axial” code might then be “**appreciation**” and this would include: music appreciation, game appreciation and soundtrack appreciation. Awe refers to general comments like “awesome!” or “epic!” and other such superlatives, similarly “affect” refers to strongly expressed feelings in response to the post so these might be put together under an axial code like “**emotion**”, nostalgia for the game might even be included here. Comparison to other soundtracks and media might be grouped with criticism; “flames” were angry responses to criticism and so could be grouped here under a heading like “**evaluation**”. “Liveness” refers to comments about the fact that the music is being performed live by an orchestra so this might be included here as well. “Music availability” included requests and replies about where to download mp3s or buy CDs, “eminence information” referred to posts about upcoming concert gigs or previous performances. These categories might then be grouped as “further information” and considered as a subset of appreciation. Game experiences and nostalgia for the game might be grouped as “**Remembrance**”, “wishing it real” were atypical, slightly odd posts where the users wished that the colossi were real and imagined them walking down their streets. It does not quite fit with remembrance but they are a form of imaginative response to having played the game so might sit better here than in any of the other categories. The fifteen “open” codes would then become four axial codes: appreciation, emotion, evaluation and remembrance.

At this point Strauss and Corbin would suggest that there may be relationships between the axial codes. Qualitative Data Analysis software packages such as NVivo and HyperResearch offer a number of tools for making graphs that might help identify such relationships. Of course there

are any number of ways to connect such abstract concepts and this is the point at which a lot of students of grounded theory get stuck. Still, let's give it a go anyway shall we. Hmm. So we could link them up like this –



It is important to remember that this kind of representation is little more than a visual aid. It does not represent any defining analysis in the way that Venn diagram might. It is not claiming a relationship between the categories, one leading to another, nor is it suggesting polarity. It does however indicate proximity. Evaluation and Appreciation are along the left hand side of the diagram, they are similar responses, some sort of evaluation is implicit in any sort of appreciation. Indeed appreciation could be subsumed by the still larger category of Judgement. Remembrance calls on previous experiences of game play, emotional responses are also the result of experience, again it would be possible to fold these codes into one still larger one, experience. These axes might be presented like this



Again the diagram, if it can be thought of as such, is merely a visual aid and in some ways it is quite unhelpful. It suggests a polarity between the two categories although there is a reciprocal relationship between the two. Indeed this relationship could be described as a dialogue.

And here something like a theory is beginning to emerge. The comments board is a space where these gamers can reflect on their experiences not solely of the music but the game which inform evaluations of that experience. This is more descriptive than predictive but it does provide a structure through which to present the data and conduct further analysis.

Tree diagrams are frequently used to express the kinds of relationships between codes explored above. A possible tree diagram for this set of codes is shown in Figure 11.

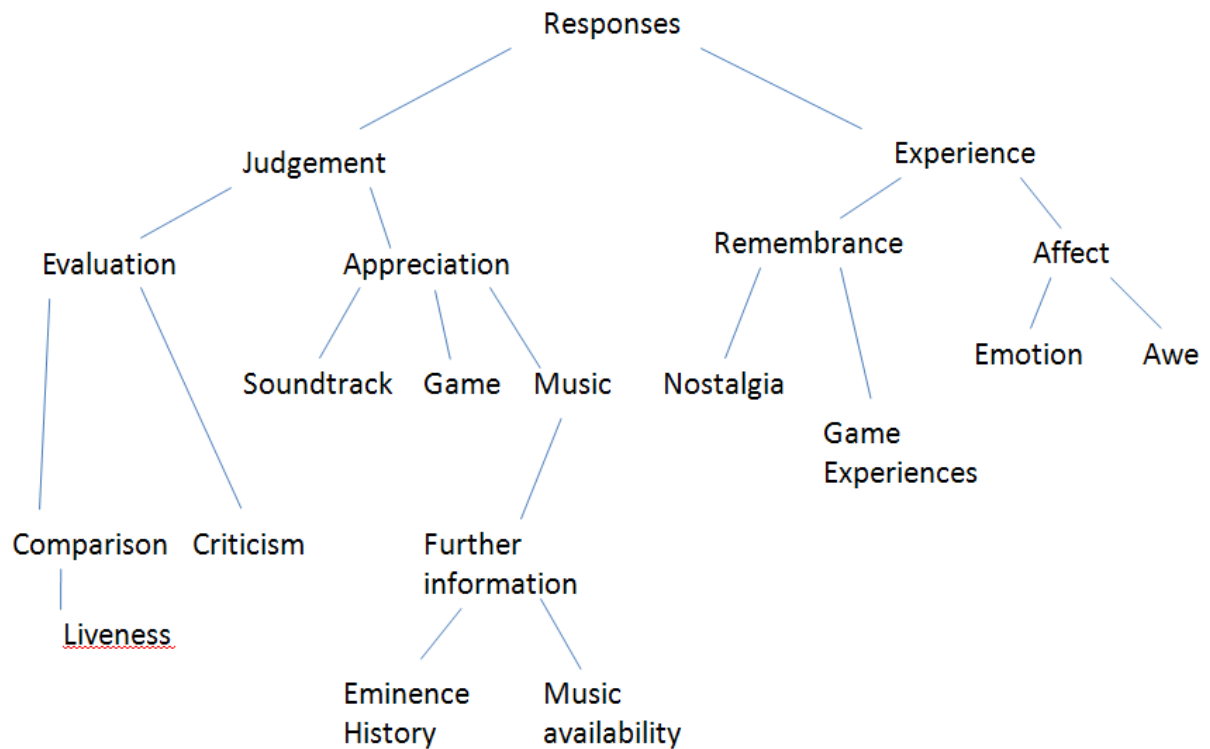


Fig 11. A tree diagram of the concepts in the grounded theory.

Again, this is more of a visual aid than any scientific statement of cause and effect. It does however indicate a general shape that can be explored in more detailed selections of the data.

Selective Coding

Broadly the codes fall into two categories judgement and experience. The following sections will explore them in more depth. Strauss would call this selective coding. Glaser would describe it as theory building.

Judgment

By far the most frequent judgement was positive appreciation. A large number of these responses focussed solely on the music for example *“I love the part with the drum in it.”* The posts coded as “soundtrack appreciation” rather focussed on the music as an accompaniment to the game *“Awesome soundtrack. Loved this song. It got me pumped whenever I was close to taking down a colossus. This game rocks!!”* A number of these responses indicated that the

music was one of the most powerful aspects of the game, indeed it was crucial to the gameplay itself. Closely related to this kind of response were those that focussed solely on the game. A number of the responses claimed that this was the best game of all time. One user echoing comic book guy in the Simpsons expressed this most succinctly in the three word post “*best game ever*”. Occasionally this led to minor flame wars where some suggested that Prisoner of Zelda deserved this accolade more but the majority of posts disagreed. Shadow of the Colossus or “SotC” was the best game of all time. These superlatives are interesting because they lay claim to lasting significance in a media which they are well aware is ephemeral and fast moving. Many of the claims were that this was the best game “to date” anticipating the possibility of better games to come but maintaining that, nevertheless this was a significant historical achievement.

The enthusiasm for the game, the soundtrack and this particular video was frequently expressed in requests for further information about the Eminence orchestra, where they play, what the conductor’s name is and so on and also the availability of the soundtrack on mp3 or CD – “*anybody know where i can get *coughs* get the soundtrack?*”. The cough here is interesting, can I buy the CD, if not, can I download it somewhere. The game is over but the soundtrack can still be enjoyed and live performances attended. Again there may be an attempt here to fix the fleeting ephemeral quality of games.

A number of the responses expressed their appreciation of the music with a comparison either to the soundtracks of other games which were generally nowhere near as good or, more interestingly, comparisons to other forms of music. “*Love that piece, my favourite aside from Moonlight Sonata*” the comparison to classical music is interesting because it equates a traditionally high art with a popular medium. The formulation is even more explicit in this post “*This must be the best video game music ever. I wish my orchestra would play this. After all, we are teenagers, it would be perfect. But noooo, we play Dvorak. Oh wait, I like Dvorak!*”. Although the music is orchestral it is not necessarily “classical”. Some players refuse the distinction “*That song is epic, me being a fan of both classical music and the game. The classical music just makes the game even better!*”. The comparisons to Beethoven and Dvorak are at some level claims to status. Like the superlative accolades “best game ever” there are claims here for the intrinsic value of the game, to what sociologists like Pierre Bourdieu might call “cultural capital” such posts might be paraphrased as - I am not just wasting my time here,

I'm appreciating the best music that the culture has to offer as well as the best game. In other words, these posts are defences of taste.

A small number of posts seek to demonstrate very refined and subtle appreciations of the music in pointing out minor flaws and imperfections "*ouch someone's out of tune in the strings and the snare was a bit too loud....nevertheless, magnificent performance.*" On occasion this resulted in hostile responses "*I'd like to see YOU do better*" if not outright flames. In one exchange a licence to speak is demanded quite explicitly "*you better be in an orchestra or something*". Again, the comments are not just statements about the game or the music but statements about who the players think they are. In taking the game and the music seriously they demand that their own interests and tastes be taken seriously.

This is most obvious in the comments coded under "liveness". A large number of the comments focussed on the fact that the music is being played by an orchestra. This orchestra specialises in playing game show themes and there are other clips on youtube of them playing the theme to Super Mario. There may be an extent then to which such performances are ironic, a set of instruments associated with the most serious "high" art performing themes from "low" art games. However the performance is not enjoyed in an ironic way "*yeah..well its good to see an orchestra put the effort of playing this piece.*". Whether the performers' intent is ironic or not the performance itself is proof of time and effort devoted to the piece. "*I've always loved the SoC soundtrack. It always gives me shivers to see this kind of music, specifically game music, preformed live. To see and hear the sounds come from human fingers and tangible instruments rather than trying to imagine them as you listen always amazes me.*" That this lyrical comment was answered with the word "nerd" suggests the enthusiasm is not necessarily universal. The thrill of a live event was also indicated in requests for further information about where the Eminence Orchestra might be playing. Enjoyment and involvement in the music on the part of these musicians is also seized on as proof of their commitment to the music. Here the conductor's seriousness is explicitly noted: "*The music conductor's demure is most confident--- his bow is so deep! Not only this piece could be spoken of as historically stunning, i was truly amazed at the conductor's outstanding confidence in himself, some people just, never fail to amaze me...sodesune!!*" Similarly the intensity of the violin player was much admired "*The violinist to the front left is really into this song. He plays it with a passion. I believe he is also the*

creator of Eminence if I am not mistaken. Notice the conductor shaking his hand at the beginning.” And more demotically *“The guy that bangs his head is fucking sick hehehehe”*.

There is a sense then in which the performance of the piece by a live orchestra validates the intense feelings that the players have about the game. Although their responses to the piece are clearly profound there is unease and insecurity about whether it should be. This is perhaps an indication of the trajectory that games have taken, from its relative youth in terms of its technological development and traditional market, the medium is beginning to take itself more seriously. Young gamers play on into adulthood and the Shadow of the Colossus is an ambitious game. Its opening sequences are self consciously filmic echoing artistic and cinematic conventions.

Experience

Many of the responses to this video indicated that quite powerful emotions had been stirred. This was often expressed as a desire to go and play the game all over again. Occasionally this sentiment was expressed humorously *“Feeling the need to kill something big and lumbering about now...”* In other posts the tone was more nostalgic *“brings back a ton of memories beating this game.”* This nostalgia occasionally became brief exchanges about previous experiences with the game. Some posts enquire for instance, if other players managed to reach the secret garden.

Other posts were more directly emotional, those labelled as “affect” were the strongest expressions of emotion. *“Oh my god. A lump formed in my throat and my eyes teared up when I heard this open up. Incredible.”* A surprising number refer to tears *“tear slides down cheek.”* It is possible that such posts are ironic but some of these players were clearly very moved by the game *“When i listen to that song i feel something i never felt before..”* occasionally such exclamations end in recommendations *“oh my god,... i have tears in my eyes.. this game was the most intense, and most emotional that i have played in my life. Buy this game”* as if the emotional outburst must be tempered with utilitarian injunctions to buy, I’m not just expressing myself I’m offering advice here. Similarly the reference to tears are tempered by slightly macho cursing *“Holy crap it made me cry”* Occasionally the posts express not only their deep attachment to the game but also puzzlement over why this it affects them so deeply *“everything about this game makes me cry with joy, why?”* Similarly *“dude i know what u mean it's like so weird. this symphony has like a spell that it casts on u. lol”*. The term “dude” is interesting as it indicates an assumption that the addressee is male. Indeed there appears to be something of a conflict in some

of the posts between the intense emotion being expressed and notions of traditional masculine traits like toughness. One post stating “*I must not cry.*” was answered with “*shut up*”. Admission of intense emotion and bewilderment at that emotion appear to be disturbing some of these players: “*I don't know what happens to me when i listen to this :(*” The colon bracket indicating a frown suggest that this is not frivolous or fatuous. The players do not understand their own reactions.

By far the most frequent code for responses to this video was “awe”. This is in part a term taken from the data itself and so a particularly good example of how a grounded theory analysis differs from a content analysis. An astonishing number of these posts include the word “*awesome*” Of the 51 posts coded as “awe” 20 of them featured the word “*awesome*” itself sometimes the post contained only that word. Others while not containing the word indicated the emotion strongly” *wow...just...wow*” or “*Whoa, how incredible is that?*” or “*Breathtaking. I love it*”. The word awesome is of course currently used colloquially as a general term of approbation. However it also continues to connote its dictionary definition of holy terror. One post fits this almost perfectly “. . .*mein god*”. For many of these players their awe left them almost speechless “*Wow,I'm just speechless....wonderful...*” or capable of .saying only single words: “*wow*” or “*Wow*” or “*WOW*” or “*just wow*”. For some their enthusiasm turned their words into long drawn out vowels sounds of appreciation “*waaaaaaaaaaaaa jiiiiiiiiiiiiii excelen jiiiiiii*” and “*WAA my favourite song of SotC T_T*”

It is interesting to note that a great many of the posts expressing general approbation do so in violent terms “*two words.....KICK ASS!!!*” “*Great, awesome, rocks – this is the language of shock and awe. It is as if their profound emotions can be expressed only in terms of violence.*”

Clearly a large number of these players are teenagers. Their user names indicate range of interesting connotations that would make up an interesting study in itself.

Fsmetal

Fantasygurl14u

Unwingedangel

Tromboneprincess

HyperBebe123

SakuraBubbles

LadyAssasin

Thewatermargin

Mrbigtime81

Boywithhorns

Shanksxy

POWERHOAX

Awesomeuserdude

MortalSyn

Although some of these names strongly suggest gender “awesomeuserdude” most are ambiguous, referencing TV shows, manga and fantasy worlds rather than gendered names.

It has long been a commonplace of research in virtual communities that they provide a space for experimentation with different identities (Turkle 1995). But at play in these posts are a range of tensions around not only gender but cultural capital. They might be paraphrased as - Is this profoundly emotional response to a game alright. Is it OK for me to be crying over this game? Is it OK for me to feel profoundly moved by this video game theme tune?

What then might a formulation of this grounded theory look like? Perhaps something along these lines –

The responses boards provide a space to express judgements and experiences of a new cultural form; although this form echoes other older arts it is new and therefore its value is uncertain; the purpose of the posts then is ultimately reassurance about this still evolving, bewitching new media.

Theory would not necessarily usually be spelled out as specifically as this. There is value in ambiguous description. Indeed, and as previously noted, a new set of categorisations can in itself be considered theory without further elaboration.

And that’s something like a grounded theory. It’s not going to win any nobel prizes but there we are. Although Glaser would counsel against it, grounded theories are often supplemented with other theories drawn from disparate areas.

Critical theory

Critical theory incorporates a number of theoretical perspectives such as structuralism, post-structuralism, feminism, Marxism, and psychoanalysis. This pluralistic approach to cultural analysis has grown from several sources. In the early 1950s, Chicago school theorists such as Theodor Adorno developed a mixture of Marxism and phenomenology which sought to analyze and moreover change mass culture. In the early 1960s French theorists such as Roland Barthes and Umberto Eco also turned their attention from “high” to popular culture. Barthes had studied literature and used techniques of close and detailed reading to analyze not poems and novels but other “texts” like films and commercials. In the 1970s, the Birmingham Centre for Contemporary Cultural Studies (BCCCS) was founded by Stuart Hall. There had been a long history of studying subcultures in anthropology but this work was primarily a colonial encounter where (typically) western field workers studied non-western cultures, usually with a view to governing them more effectively. In the BCCCS, analytical tools that the West had developed to understand distant countries were turned back onto itself.

Theodor Adorno is perhaps the best known exponent of critical theory and one of the first to ask what a sociology of music might look like. Writing on the cultural industries of the nineteen fifties, Adorno and Horkheimer (1986) pointed to the similarities between the ways in which leisure and work time were structured and monitored. For these authors, the cultural industries exacerbated the artificial division between enjoyment and the rest of life: “Amusement under late capitalism is the prolongation of work.” (Ibid: 137). Although amusement is sought as an escape from mechanized work, mechanization determines the production of “amusement goods” with the result that leisure experiences are “inevitably after-images of the work process itself” (Ibid).

Adorno disliked popular music seeing it primarily as a standardised musical form. The rigid structure of the pop song with its exactly repeated verses and refrains was a debasement of the musical imaginations not only of the composers but also the audience. He was similarly disparaging about movie soundtracks:

“Much of the consumers’ music anticipates fanfares at victories yet accomplished, along with the applause. The garishly instrumented film titles which so often seem to resemble a barker’s spiel: “look here, everyone! What you will see is as grand, as radiant, as colourful as I am! Be grateful,

clap your hands and buy” – these set the pattern of the consumers music even where the feats proclaimed by the shouting do not follow at all. (Adorno 1961p 46)

This could almost be a description of “The Opened Way”. The content analysis indicated that a number of users had substituted the game theme with Carl Orff’s *Carmina Burana*. It is in many respects a similar piece of music. Orff wrote the music for *Carmina Burana* in the 1930s but the piece echoes older forms of religious and folk music. The lyrics were taken from a Latin manuscript which dated back to the middle ages. The piece was echoed in horror films such as *The Omen* which also employed large choirs singing in Latin to evoke numinous and sinister effects. “The Opened Way” features no choral singing but the orchestrations of *Carmina Burana* are clearly an influence as is Wagner’s *Ride of the Valkyries*. The piece then draws on a rich tradition which resonates through many media.

The sense of awe in these related media refers to fear, terror and dread that has religious connotations. Etymologically this kind of dread is “mingled with veneration, reverential or respectful fear” in the presence of God or later nature. Here the music references earlier forms which also seek to inspire awe either of God (as in *Carmina Burana*) or national destiny (Wagner). Here the musical effects (heavy timpani, crashing symbols, swelling string sections punctuated by dramatic horns in chorus reaching its crescendo in a military tattoo) are employed to create a sense of awe not before God, or Nature or Nation but rather a video game.

The bewilderment of the awed consumers is in this sense understandable. Should I be awed by this game? Should I fear and revere it? Clearly the game makers would hope so. The injunction here is undoubtedly to buy. And yet the performance of the theme in the context not of the game but a live orchestral concert subtly changes its meanings. Must we dismiss it as low art along with Adorno? Not necessarily.

Marxist analyses of the cultural industries and leisure are, of course, deeply unfashionable and have been criticized for their pessimism and elitism. Empirical studies on the actual uses of cultural products have show than consumption is not passive: private and individual meanings are invested in leisure activities despite hegemonic intent (Willis, 1990). We do not watch TV solely because we have become the numbed spectators of our own lives, passively and joylessly consuming spectacles as what Garfinkel called “cultural dopes”.

Indeed critical theory is in some respects at odds with grounded theory. Glaser warns researchers not to read related literature. However many would argue that it is never possible to approach any data set with an entirely theory free mind. Nobody can unread a book they have read or temporarily abandon or discard all of the ways in which they have previously made sense of the world. To claim ideological neutrality is itself an ideological position. Acknowledging and sourcing theoretical sources indicates that the account is one amongst many and may be supplemented or overturned by other perspectives. There can be no final or ultimate meaning to any cultural artefact there are as many readings as there are readers.

Discussion and Further Work

In all of the approaches discussed, it is possible to provide insights into the nature of the YouTube content and the community who use it and contribute to it. These insights of course differ with different research methods: statistical approaches show how modelling might provide the ability to infer changes in viewing behaviour of a particular topic over time; content analysis breaks down the different sorts of videos to see what they are “about”; grounded theory reveals how people’s response to a video reflects attitude to old and new media; critical theory suggests how the split between low and high art is writ large in a single YouTube video. Each of these insights is interesting and suggests avenues for further fruitful research.

There remains however the challenge posed by the very size and rate of growth of YouTube. Already the number of videos found on a search for the Hudson River is well over a thousand – around double what it was when this chapter began. There have been more than 34,000 further viewings of the Eminence Orchestra playing “The Opened Way” since the last search point in January and a further 100 videos uploaded that match the search “Shadow of the Colossus.”

In terms of content analysis, it is unlikely that these changes pose specific problems. We would make a fairly confident claim that there are no really new types of video being uploaded that would defy the existing categorisation or inform it in any significant way. But then, the content analysis perhaps had the least interesting message about what YouTube is as it simply reports on the kinds of things that appear on YouTube without trying to account for them or their popularity with YouTube viewers.

For statistical analysis though, these changes are quite large and whilst the overall shape of the statistics may remain the same between quite large gaps in data gathering, there are definitely circumstances in which the changes are substantial and perhaps defy the models that we are proposing here. For example, since writing up our work on iPhone 3g (Blythe & Cairns, 2009), the most popular video is no longer “Will it Blend?” with a new video having a lot higher view count. How is this possible in the rich get richer model? Is something else driving viewing figures?

Another challenge for the statistical analysis is the superfluity of data that YouTube offers. Usually statistical methods work with a sample available and infer properties of the underlying (hypothesised) population. With YouTube, the samples available for a given search term are massive proportions of the total hits that YouTube reports – inferential statistics are barely necessary. And more deeply, why would we need to infer anything at all? To find out more, we just look for longer. The models provide potential descriptions of viewing processes but the question then arises how generalisable are these models to other topics? The *Shadow of the Colossus* is a videogame and therefore likely to be of at best short term interest. But what about a different topic that might have long term relevance like “chemistry experiment” where what matters is not being up to date but being accurate and informative? (And for which there are currently 2120 hits) Will that grow and develop in the same way that *Shadow of the Colossus* has? And what about very rapidly changing topics like news stories that can have multiple evolving perspectives (angles) and recur thanks to new information, revived relevance and so on? We believe the modelling approach is promising but given the size and scale of YouTube this is currently, and possibly only ever, a belief.

The same problem of general relevance can be applied to the grounded theory approach. The theory produced here is interesting but it is only based on the comments of one video that was popular for one topic. Also, there is perhaps a more subtle problem in analysing the most popular video. This may seem reasonable – a lot of people have viewed that video and therefore the comments are about something of significance. However, the whole statistical modelling approach suggests that the underlying process is random and that whatever gives a video an edge over other videos, the rich gets richer process will continue to promote that video over others. That is, the most popular video may just be a quirk of fate.

Additionally, analysing more comments becomes an endless task. At what point will it no longer be necessary to produce a grounded theory? This is an identical problem to that faced in statistical analysis. When do you stop analysing and start generalising? And on what basis?

Critical theory does therefore offer a way to slice the Gordian Knot of YouTube's size. Though we have analysed the most popular video and therefore that may be questioned as for the grounded theory, this is irrelevant. Critical theory has picked out a cultural artefact, for whatever reason, and presented a reading of that artefact that provokes ideas and provides insight.

This is not to say that critical theory is therefore the best method indeed it is likely to be the most controversial. Rather it is only through a multi-method approach that it will be possible to provide a rich picture of what is represented in YouTube and the community that make and consume it.

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