BETWEEN SCIENCE POPULARIZATION AND MOTIVATIONAL INFOTAINMENT: VISUAL PRODUCTION, DISCURSIVE PATTERNS AND VIEWER PERCEPTION OF TED TALKS VIDEOS

RADU MEZA[1], CONSTANTIN TROFIN[2]

ABSTRACT. This research tries to explore the popular TED talk video format by analysing the technical aspects of the visual production and discursive patterns in the verbal content in relation to the most popular ratings applied by the users. Our analysis shows how the visual production format uses direction and editing to convey information and emotion. The results also point towards an increasing trend favouring inspiring emotional human interest stories of personal experience, besides the informative academic treatment of science, technology or design.

Key words: visual production, discursive patterns, online videos, infotainment, science communication, computational linguistics

I. Introduction

TED started in 1984 from Saul Wurman's premise of a powerful convergence among three fields: technology, entertainment and design. Although not very successful in the beginning, the TED conference became an invitation-only annual event bringing together high-profile speakers and influential audience members from many fields. In 2001, TED was acquired by media entrepreneur Chris Anderson's non-profit and, after also starting the TEDGlobal series of international events, in 2006 the TED Talks audio and video podcasts were released free online to considerable and immediate

[1] *Ph.D. Lecturer, Journalism Department, College of Political, Administrative and Communication Sciences, Babeş-Bolyai University, meza@fspac.ro.*
[2] *Ph.D. Assistant, Journalism Department, College of Political, Administrative and Communication Sciences, Babeş-Bolyai University, trofin@fspac.ro.*

success. According to ted.com, "by 2009, the number of TED Talk views had grown to 100 million views, making Internet heroes out of speakers like Jill Bolte Taylor and Sir Ken Robinson" (-, 2015) and in 2012, TED Talks had recorded its one billionth view. More than thirty years after its inception, TED has become a viral video phenomenon inspiring people world-wide, captivating more and more people's attention with new videos, spin-off associated events and educational projects such as TED-ED.

TED Talks videos are generally video recordings of presentations or performances at live, public TED events. In 2015 the TED Talks website includes over 2000 videos, most of which have transcripts, ratings and numbers of views and shares associated.

The online success of TED talks videos is attributed by Chris Anderson to an appetite for ideas communicated in an inspirational way – which was not a "top-down plan", but rather a "bottom-up phenomenon", transforming the event from "an elitist talking shop to an ideas platform"(Cadwalladr, 2010).

However, this phenomenon also has its critics who think TED Talks lead to the oversimplification of science and turn science communication into popular infotainment, or as one critic puts it: "middlebrow megachurch infotainment"(Bratton, 2013). The same author claims "the key rhetorical device for TED talks is a combination of epiphany and personal testimony (an epiphimony if you like) through which the speaker shares a personal journey of insight and realisation, its triumphs and tribulations"(Bratton, 2013).

Taking this into consideration, it becomes interesting to investigate the format of TED Talks videos from the perspective of video production, but also observe discursive practices in relation to viewer perception as recorded by the ratings on the ted.com website.

II. Researching TED Talks

The amount of online attention received by TED Talks has captured the interest of researchers in many different fields in the last few years. Some academics discuss on the use of such content for education (Romanelli, Cain & McNamara, 2014; Rubenstein, 2012) while others focus on science popularisation through TED Talks online videos or use the transcripts to drive computational linguistics or machine learning projects (Rousseau, Deléglise & Esteve, 2012) – as the site provides good quality audio-video recordings with time-stamped transcripts for almost all videos.

A recent in-depth graduate-level investigation of TED talks within the theoretical framework of Genre Theory (Theunissen, 2014) looks at visual communication in the TED Talks by comparing them to the genre of the academic conference presentation. While the two may look similar, the conference presentation addresses a live audience of peers involved in similar scientific work, while TED Talks are closer to science popularization and address live audiences of lay people. Furthermore, the research into the visual aids used in the presentations clearly differentiates TED Talks from conference presentations. While the most important aspect of visuals in conference presentations is convincing the peer audience, TED talks use visuals "to explain the findings, to exemplify or to make the audience laugh"(Theunissen, 2014).

In recent years, two scholars – Sugimoto and Thelwall – have looked at TED talks extensively from the perspective of science communication characteristics, impact and also viewer community interaction (Sugimoto, Thelwall & Larivière, 2013; Sugimoto & Thelwall, 2013; Tsou, Thelwall, Mongeon & Sugimoto, 2014). They concluded that TED talks impact the public sphere primarily, rather than the academic community and that science and technology videos presented by academics are more successful than those presented by non-academics. While this popularizes science and many TED Talks videos seem to be included in syllabi for higher education, it does not contribute significantly to promoting the scientist's research within the academic community in terms of number of citations. Research into the audience's reactions to presenter characteristics and platform (YouTube or the TED website) shows that viewers discuss the presenter on YouTube, while on the website they engage with the content of the presentation. Also, looking at negative and positive reactions in comments, the researchers have concluded that female presenters stir more emotion (both positive and negative)(Tsou et al., 2014). Further research on word use according to TED speaker classes (gender and background) is becoming fertile ground for researchers in communication sciences and natural language processing and knowledge mining (Tsou, Demarest & Sugimoto, 2015).

In studying TED Talks videos, our approach will draw from previous research using natural language processing and computational linguistics methodology over a dataset comprising all the video transcripts uploaded to the TED website until July 2015. However, we will be also combining this computational analysis approach with an in-depth qualitative analysis of the visual production techniques of the TED Talks video format.

III. Research design and method

In the context of the global phenomenon's increasing online popularity over the past decade, our research tries to identify, describe and assess the visual production format, discursive patterns of successful videos and viewer perception. We will try to answer the following research questions:

RQ1: What are the visual production characteristics of the TED Talks video format?

RQ2: What are the characteristics and ratings of the most popular videos?

RQ3: What discursive patterns and topics are associated with popular videos/ratings?

a. Method

This research combines large-scale computational analysis approaches, including natural language processing and automated qualitative discourse analysis of all the video transcripts on the TED Talks website, with in-depth qualitative content analysis of the visual aspect of a sample of the most successful videos to answer the research questions.

i. Data collection

The data used in this research were collected from the TED Talks website in July 2015 using the Helium Scraper software. For each of the over 2000 videos found on the website, we collected the following variables:
- presentation title
- speaker name
- speaker occupation
- event
- year
- viewer rating
- duration
- total number of shares
- full text transcript

The viewer ratings are selected by viewers from a fixed taxonomy that comprises 14 mostly positive terms:

Table 1. TED Talks ratings taxonomy

Beautiful	Longwinded
OK	**Informative**
Persuasive	**Fascinating**
Inspiring	Unconvincing
Funny	Obnoxious
Ingenious	Confusing
Courageous	Jaw-Dropping

However, the main video web page only displays the top two user ratings for each video and the detailed scores can be accessed in a pop-up detail window. For this reason, the user rating variable will mostly the ratings highlighted in Table 1.

ii. Analysis methods

Data preparation and clean-up was done using MS Excel and the ASAP Utilities add-in: conversion of durations in seconds, computation of number of words in transcripts and average speaking speed, exclusion of special characters and time-codes from transcripts.

Main analysis was done using two free software applications: Tableau Public 9 and KH Coder. We used Tableau Public to produce visualisations describing the dataset and KH Coder was used to analyse the content of the transcript in relation to the other variables using part-of-speech tagging and word co-occurrence analysis.

IV. Analysis

a. Visual construction of TED Talks videos

TED talks are about "Ideas worth spreading". Then, what is the relevance of the visual approach of the video presentation, as TED is about ideas and personal experience and not really about visuals? What does it take to make TED talks a thrilling experience for the audiences watching the presentation on their computer screens?

i. The challenges of directing and editing a TED video presentation

TED talks are a one man shows. A show in which a respected personality is actually spreading ideas worth taking into consideration. More than that, this show happens on a stage, in a fully controlled environment. Surprises are out of the question: Speakers do their job on a stage, their movements are limited by the stage itself, the lights on that stage, as it would be a nonsense for a speaker to wander in the dark, not only for the sake of the video shooting, but also of the presentation itself. Wireless microphones require the speaker to move within a designated area, in order to avoid annoying interferences. The public is there to attend the presentation willingly, so no surprises are to be expected from that part either.

Given the context, one could hardly imagine a situation more convenient for the video director. There is a very limited number of visual marks: The speaker himself and the screen on which graphics are to be shown and videos are to be played. So, from a strictly contextual point of view, a single camera on a wide shot taken from the back of the hall would do the job – as in the case of most recorded conference presentations. But the TED Talks videos are more than just recording of presentations as they try to convey a similar experience to that of being there.

ii. Producing a TED Video Presentation

The video production of an event like TED must be taken seriously if it is to reach its aim. Audiences watching a presentation must get "brought in" to such a level that they would actually get a sense of being there and being fully absorbed by the presentation, in order to get a feeling similar to the ones actually attending that presentation.

This is not a trivial task for visual directors. They must make the viewer see and understand the information that's being delivered by the speaker, but also "feel" what's to be like to watch the presentation from the crowd.

The elements the director must pay attention to are the speaker himself, the video signal destined for the projection screen or video-wall, the relationship between the speaker and the screen, the relationship between the speaker and the public, and the reactions of the public itself. This task calls for a professional approach of visuals and audio. The directors must imagine a set-up of cameras that allows them to follow the presentation in

an interesting, dynamic and fluent way. They must decide on the number of cameras, staging and blocking, supplementary lighting (if possible) and also on sound pick-up.

iii. Visuals

The director's task is to produce a powerful video presentation of the speech. In the end, the presentation must be fluent, easy to watch and understand and to attract the viewer. In order to achieve this goal, the presentation must have good quality pictures, a wise selection of shots and a fair rhythm, attained by cleverly alternating varied shots. These should enable the director to get that rhythm in the edit. In order to achieve this, two types of visual sources are used: The cameras recording the action and the computer delivering graphics and videos. The number of cameras depends on several aspects: The type of presentation, its complexity, the dimension of the stage and hall, the number of available camera operators (if they are too few, some cameras must be blocked on fixed shots) and the skills of the camera operators, in terms of their ability to swiftly reframe shots, thus allowing one camera to deal with several types of shots. The director should be able to deliver all types of shots needed:

1. Shots of the speaker – extreme long shots to see the entire stage with the speaker and the video screen in the background, long shots to show movements on the stage, medium shots to show gestures, close-ups to see the facial expressions, understand the speaker's feelings and feel their energy. Sometimes even extreme close-ups can be used to achieve this.

2. The video signal from the computer should be recorded separately for later insertion in the edit.

3. Shots of the public should be taken into consideration, both group and individual shots, to illustrate the audience's reaction. Without these shots, the viewer will never get the feeling that he is actually participating to that presentation.

Combining all these shots in the edit would deliver a video presentation with a fair rhythm, always showing the important thing to be seen at any particular moment, guiding the viewer's attention just as it happens, like in the case of actually attending the live presentation.

iv. Lighting

In some cases, stages are lit according to video production demands, in others they are not, so the director must do the best he can within the constraints of the environment. Considering the great variety of TED events,

this is largely a matter of budget and sometimes depends on the technical level of the stage. Some stages have professional lighting equipment, some don't, case in which, if the budget allows, supplementary lights should be installed for the sake of the video presentation.

v. Sound

There are several aspects that need attention in terms of capturing and recording sound in the case of this type of presentation:

1. The most important aspect is the voice of the speaker. As speakers move freely on the stage and sometimes they have their hands busy showing things to the audience or even playing an instrument, they need a portable wireless microphone. The handheld microphone, although sometimes delivering a better sound quality, is not a good choice. It is uncomfortable for the speaker because it keeps one hand occupied at all times, but it is also a problem for sound recording, as its position constantly shifts, as the speaker moves his hands and head, delivering an ever fluctuating sound level. Depending on the nature of the presentation, the director has to decide whether to use a wireless lavalier microphone or a headset. The lavalier microphone is easier to mount, as it's placed on the speaker's clothing, keeping a constant distance from the mouth and leaving the speaker full freedom of movement. It should always be the first choice, unless there are sounds to be made during the presentation in the vicinity of the microphone, such as practical demonstrations which might produce noises that would hamper the good reception of the voice. The same happens when the speaker plays an instrument during presentation, as the lavalier capsule is an omnidirectional microphone. In these cases, the headset remains the only solution. Its capsule stays close to the mouth in the same position. It is very convenient as it does not hamper speaker's movements but it is quite uncomfortable to wear. It is uncomfortable to wear it around your neck and over the ears and it might distract the speaker. Often, because of the movements, the line becomes too short, causing it to be too tight and limiting the turn of the head to one side. So, whenever possible, producers should use a lavalier microphone.

2. The second sound signal comes from the computer, sound accompanying videos or slideshows.

3. And the third sound to be picked is the ambient sound. This is the sound of the hall, particularly the sound of the audience responding to the presentation by applause, laughter, sighs or any other human sounds.

4. In addition to these, if the presentation includes dialogue with the crowd or questions from the audience, a set of wireless handheld microphone should be at hand, along with the operators who takes them to the people speaking from the audience.

Best sound directing is being performed on the spot, as sound should be picked from the sound mixer of the show. In most cases this controls only the speaker and the computer, so the ambient sound should be recorded separately and added in the postproduction stage.

vi. *Video Presentation of Al Gore's Speech on Climate Change*

An example of a TED video presentation performed in average circumstances is Al Gore's speech on new thinking on the climate crisis, which took place in Monterrey CA.

The director had little to do about improving lighting, which was pretty bad, so they had to adapt to the situation. They used a classical scheme of staging and blocking, covering the whole event by three cameras. The numbering of cameras is the author's choice, numbering them from right to left, as they were positioned on the set.

Camera 1 was placed on the right side of the stage, delivering a slight high angle. This camera produced medium shots facing left (Fig.1), and facing right (Fig.2), but also wider shots of Mr. Gore pointing at the screen (Fig.3). In the final part of the presentation, the camera was moved from the tripod to shoot handheld low angle close-ups from the floor level (Fig.4).

Fig.1. Cam.1 medium shot left face   **Fig.2.** Cam.1 medium shot right face

Fig.3. Wide medium shot with
screen fragment

Fig.4. Medium shot low angle
handheld

Camera 2, positioned deeper into the hall and medium to the left was mainly responsible for taking extreme long shots of the speaker with the screen in the background, as seen in figures 5 and 6.

Fig.5. Cam 2 Extreme long shot from left **Fig.6.** Cam 2 extreme long shot from left
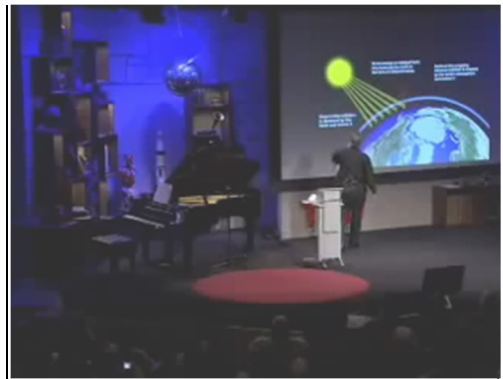(with screen in sight)   (with screen in sight)

Camera 3 was positioned to the left of the stage, at stage level and was responsible for close-ups of the speaker (Fig. 7 and 8) and wider shots (Fig.10) or going as wide as longshot in zoom-out motion (Fig.9) in order to set an alternative to extreme long shots from camera 2, for better dynamics of the presentation.

Fig.7. Close-up right face

Fig.8. Close-up left face

Fig.9. Long shot with screen in shot

Fig.10. Wider medium shot right face

Turning to the public, camera 3 was also responsible for picking the reactions of the public, in extreme long shots only (Fig.11). Unfortunately these shots suffer from very poor light.

Fig.11. Extreme long shot on public

The computer graphics were seen in the extreme long shots delivered by cameras 2 and 3, but for a better understanding, they were also presented full screen, picked up as an independent video source, as seen in fig. 12, 13 and 14.
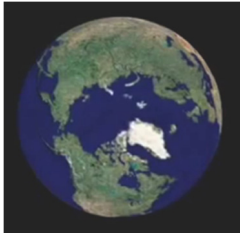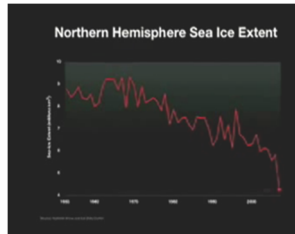

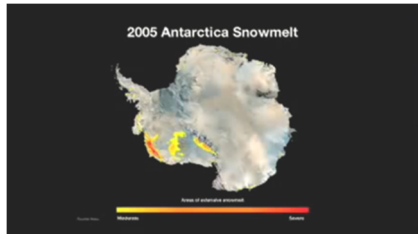**Fig.12.** Slide 1   **Fig.13.** Slide 2   **Fig.14.** Slide 3

Vice-president Al Gore's TED Talks presentation became very popular after being distributed online. Looking at the technical aspects of the visual production of such videos, we may conclude that although the set-up for these events is not always optimal and varies considerably, there are several key aspects that contribute significantly to constructing the videos for online live broadcast and subsequent distribution and that make the format recognizable and also easily distinguishable from most recording of academic conference presentations or lectures. Most importantly, by also using medium shots, close-ups and full screen views of the slides from independent video sources, this kind of production is better able to convey emotion and information as well as providing the viewer with a similar experience of that of a member of the live audience.

b. Ratings, speakers and shares

Looking at the top ratings for the N=1570 videos for which we collected data about the year of the presentation in fig. 15, we will observe a clear dominance of videos rated *Inspiring, Informative* and *Fascinating*.

Furthermore, the graph in fig. 16 shows how the most used user ratings co-occur. On the left we have the first rating and on the right – the second rating. We notice that while *Inspiring* co-occurs in relatively similar proportions with all the other top ratings, *Informative* co-occurs mostly with *Fascinating*, *Inspiring* and *Persuasive*. This might signify that most users perceive an emotional value in watching TED Talks videos, while the informational value (although clearly present) is less important than the inspirational value and only applies to some videos. While most videos are perceived as being inspirational (as a first or second rating), only some as perceived as being informative.
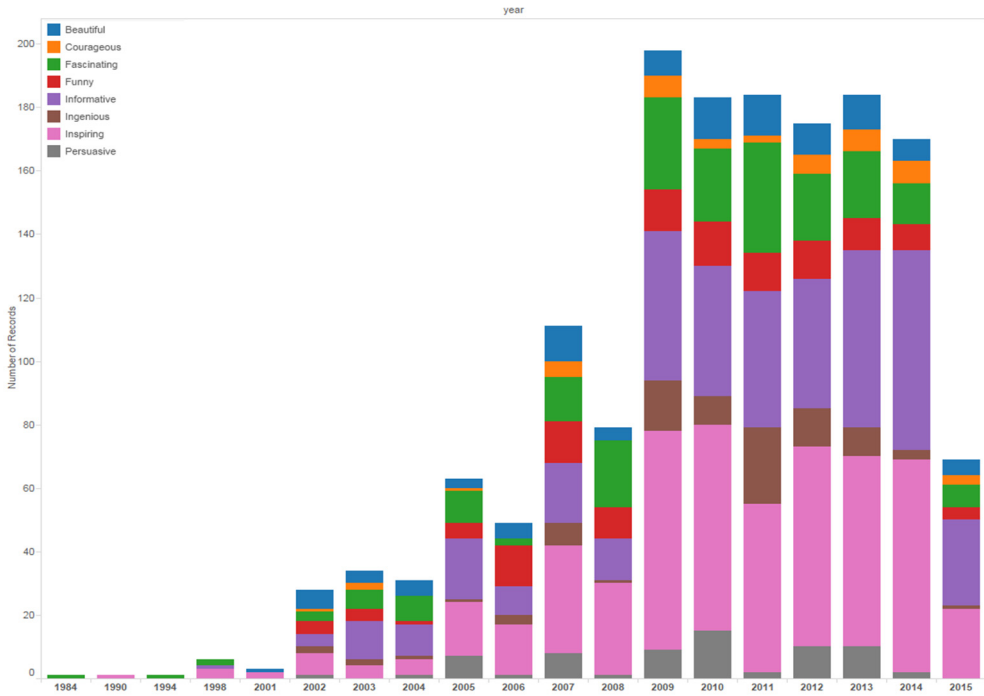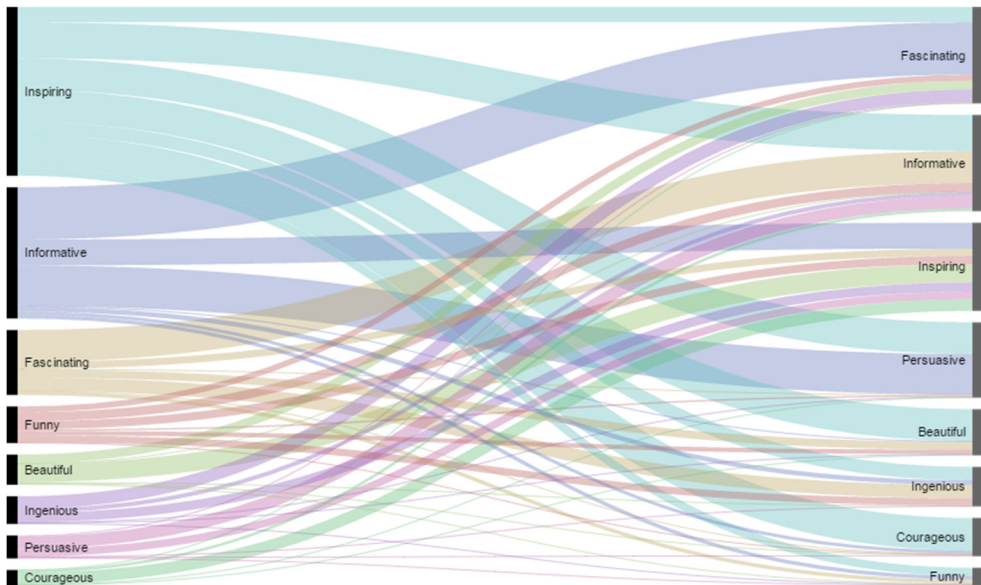
Fig. 15. Ratings per year

Fig. 16. Top two ratings co-occurrence

We also analysed the average speaking rate (measured in words per minute by using a word count on the transcript and the video duration). For all the video ratings categories the average speaking rate is around 150 wpm, except for the videos that have been rated Beautiful, where it is much lower as a result of this types of videos mostly being or including musical or dance performances.

It is interesting to look at the average speaking rates of the speakers who delivered some of the most successful TED Talks presentations (fig. 17). We notice that Sir Ken Robinson's very successful four videos feature an average speaking rate below the general average.

Fig. 17. Most shared/viewed speakers with speaking speed (wpm)

Further investigation into what viewers consider to be Inspirational, Informative, Fascinating and so on requires us to look into the verbal content of the presentation and analyse discursive practices.

c. Analysis of discursive patterns

Using KH Coder, we tagged the parts of speech in the transcripts of N=1912 videos using the integrated Stanford POS tagger and tried to detect patterns of speech associated with certain variables (ratings provided by

users, period of presentation and popularity of the presentation). We also tagged several n-grams (two, three or four words expressions) that appeared very frequently in the corpus.
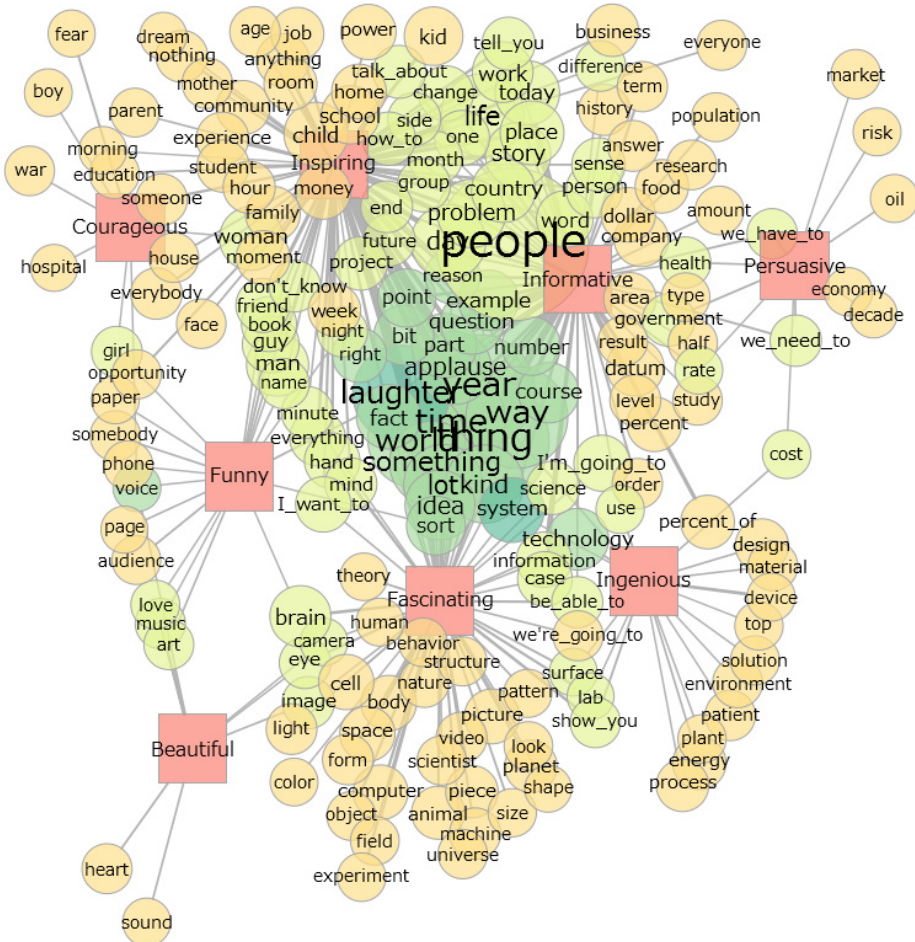

Fig. 18. Co-occurrence network of ratings, parts of speech and n-grams (min. TF=500)

It is interesting to notice in fig. 18 that the most used ratings (*Inspiring* and *Informative*) feature frequent expressions such as "how to", "tell you", "talk about" and frequently occurring terms such as "life", "people", "story"

while, for example *Informative* and *Persuasive* videos feature expressions such as "we need to", "we have to" and the *Informative* rating seems to cover mainly social issues. Judging by the most frequently used terms, stories which are rated *Inspirational* seem to be stories of personal experience.
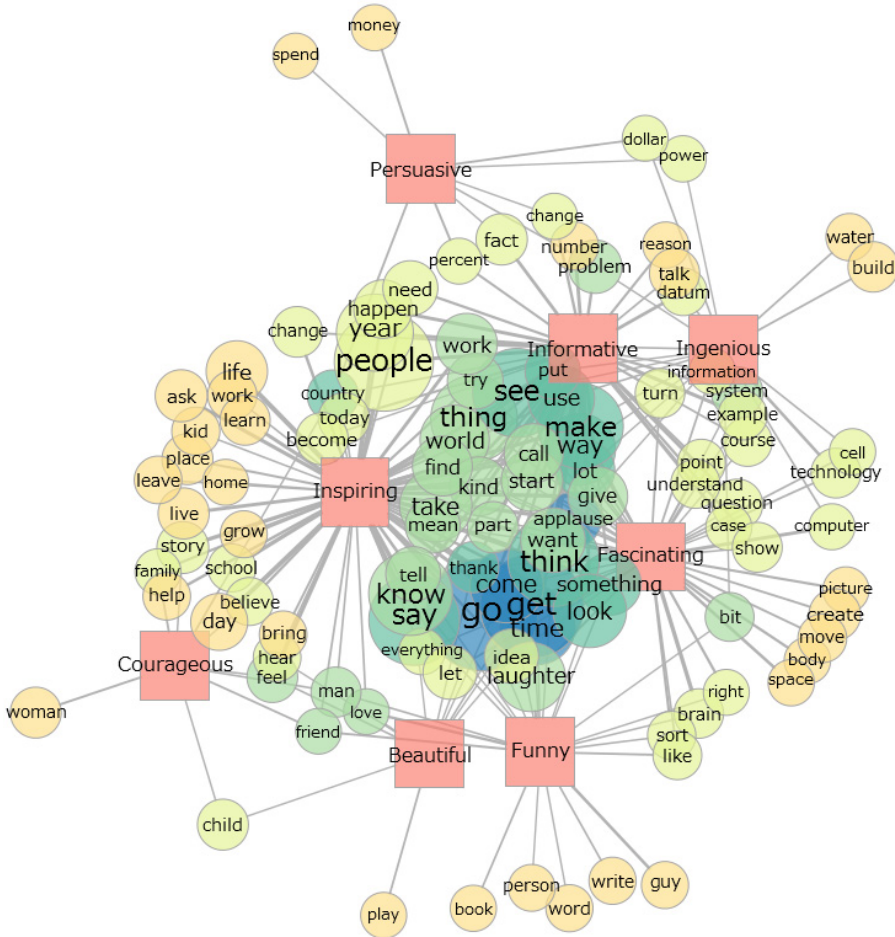

Fig. 19. Most frequent verbs and nouns co-occurrence network with ratings (min. TF=1500)

By increasing the frequency threshold to a minimum frequency of 1500, we can look at the most used nouns and verbs associated to each of the top ratings in figure 19.

Figures 18 and 19 show how terms relating to science, technology and design are mostly found in transcripts of speeches with ratings such as *Ingenious* and *Fascinating*. The videos rated *Persuasive* seem to specifically contain terms relating to resources, economic and financial issues.

Figure 20 features the talk shares/views variable binned into 5 categories (over 10 million views, between 5 and 10 million views, between 1 and 5 million views, under 1 million views and no data). The most successful videos seem to have the common feature of containing expressions such as "I'm going to" or "I want to". The diagram suggests the most popular videos features theme such as family, childhood, humanity, improvement, money/resources and technology. The videos that are in the two categories under 5 million share lots of frequent term occurrences.
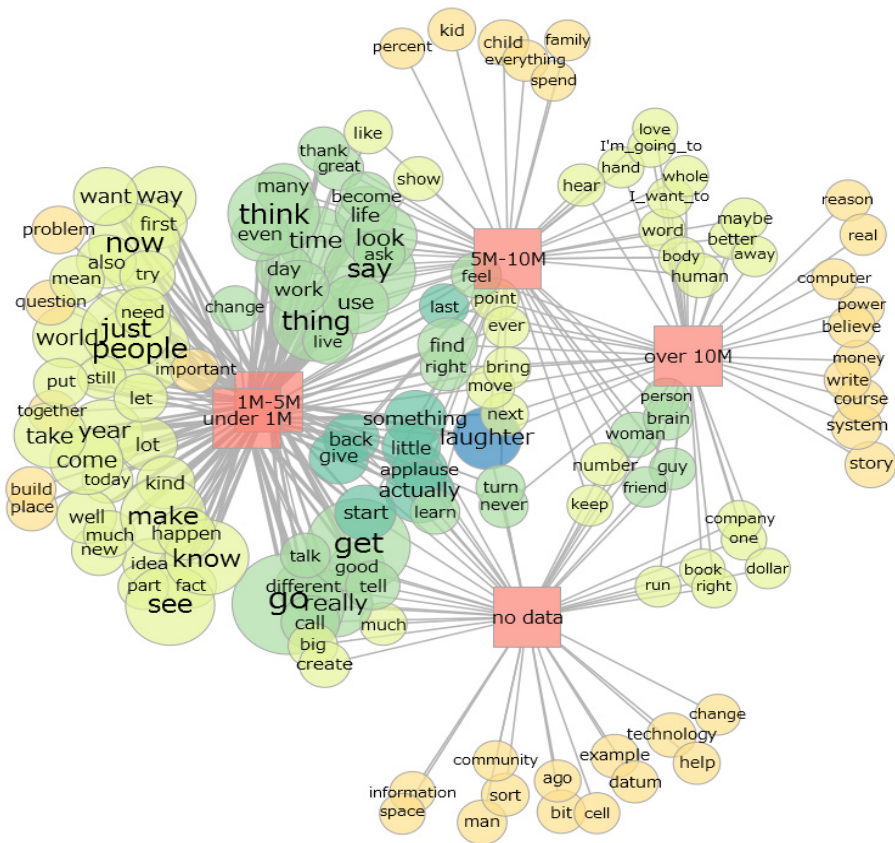

Fig. 20. Most frequent verbs, nouns, adverbs and adjectives
in co-occurrence with number of shares/views categories

Figure 21 shows another co-occurrence diagram of most frequent terms in speech transcripts, this time binning the year variable into eight categories in order to observe the discursive specificities of TED Talks presentations with respect to certain time periods. The period of increasing success spanning from 2008 to the present appears quite homogeneous. The specific terms occurring only in the recent 2014-2015 period seem to feature verbs like "feel" and "believe" and nouns like "man", "woman", "family", "friend" and "community". These may be interpreted as a sign of an increasing trend towards sharing warm, emotional, human interest stories of personal experience.

Fig. 21. Co-occurrence network of nouns, verbs, adverbs and adjectives
with time periods

Analysing discursive patterns in TED Talks transcripts provides insight into the themes covered by the speakers and also their perception by the viewers. Common terms among popular videos show a trend towards inspirational, emotional human interest stories featuring family and childhood.

V. Findings and conclusions

This research has looked at visual production techniques and discursive patterns in order to pinpoint the specificities of TED Talks videos – a type of content that has become a viral sensation within the last decade, triggering a plethora of associated global events, producing more and more similar content. Although previous research compares TED Talks to the conference presentation genre, the analysis of the video production patterns shows that there is great emphasis on also the video being able to convey emotion, not only on its informational content. Also, as previous research suggests, TED Talks videos have an increasingly large audience of lay people, non-academics, both on site and especially online. Mainstream success and sharing may be related to the turn towards more stories of personal experience which emphasize the emotional, human interest aspect, a trend which is, as we have mentioned in the introduction, increasingly criticized by some.

By looking at how tags are applied by users on the TED website, we have tried to circumscribe what the viewers perceive as being *Inspiringl, Informational*, *Fascinating* and so on. While the *Fascinating* and *Ingenious* ratings seem to be applied to presentations with more technical or scientific content, *Inspiring* and *Courageous* seem to be applied to emotional stories of personal experience. Talks which are *Persuasive, Fascinating* and *Inspiring* often feature a strong *Informative* rating as well – a rating which seems associated with an academic treatment of social issues.

Further research could use qualitative analysis methods to also investigate speech structures and nonverbal communication patterns in such videos and underpin the mechanisms that convey information and emotion both verbally and nonverbally.

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