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***Analysis of the visual channel of
communication in a corpus of TED
Talks presentations***

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1. INTRODUCTION

The present study examines the use of visual semiotics by leading-edge presenters via the analysis of a corpus of presentations, more specifically TED Talks. TED is an online platform for the exchange of ideas and knowledge. The nonprofit organisation's mission statement explains its goal:

“We believe passionately in the power of ideas to change attitudes, lives and ultimately, the world. [...] we're building a clearinghouse of free knowledge from the world's most inspired thinkers, and a community of curious souls to engage with ideas and each other, both online and at TED and TEDx events around the world, all year long.” (<http://www.ted.com/pages/about>)

TED was founded in 1984 as a conference to disseminate innovative ideas in the fields of technology, entertainment and design (TED). TED holds live conferences in front of live audiences. Academic and non-academic speakers (scientists, artists, entrepreneurs, innovators, etc.) are given the opportunity to deliver a presentation, most often concerning scientific research, a certain expertise or personal experience. Since 2006, TED has posted the videos of these conferences online, making them accessible to a broader audience. As a result, it has transformed from a small-scale, elitist conference into a popular, influential, large-scale, web-mediated platform. As of July 2014, the site was offering over 1,700 different videos. According to the organisation¹, the TED videos have been viewed more than 1 billion times [November, 13 2012], with an average of 17 new page views per second² and approximately 1.5 million views a day. TED's increasing influence makes it an interesting medium for analysis (<http://www.ted.com>).

Moreover, little research has been done on TED Talks and the type of presentation that TED delivers. This study offers a starting point by comparing TED with academic conference presentations (CP). The rationale for this approach is that CPs are close in terms of genre to TED. They show many contextual parallels: conference context, live audience, form, length, type of speakers and topics. Approximately one-third of the TED Talks are about topics related to science or technology [Sugimoto & Thelwall, 2013: 673]. TED makes scientific knowledge available to a broad audience, a phenomenon known as science popularisation.

¹ <http://blog.ted.com/2012/11/13/ted-reaches-its-billionth-video-view/>

² <https://www.ted.com/about/our-organization/history-of-ted>

However, spoken academic discourse has received less attention from researchers than written academic discourse has (e.g., the scientific article). Research into the visuals of CPs remains especially limited, comprising only to a very small number of studies (Dubois 1980, Rowley-Jolivet 2000, 2002, 2004, Degano 2012, Charles & Ventola 2002). Nonetheless, the importance of visual communication in conference presentation has been recognised by many researchers (e.g., Kress & Van Leeuwen 1996, Rowley-Jolivet 2000, Swales 2004). Because of the multimodal character of CPs, studies that focus on the verbal structure of CPs can only be partial accounts of the genre as the visual dimension is not included (Rowley-Jolivet 2002). Scollon and Levine argue that “a monomodal concept of discourse is distorting, and therefore, now that we can, we should open up the lens to discover a fuller view of how humans communicate.” (2004: 3)

In this exploratory study on TED, we will focus on the visuals in the hope of shedding light on their use in TED presentations and in spoken academic discourse. We analyse the visuals in a small corpus of twelve TED Talks in the category science and compare them with existing research and theory on visuals in CPs. We are performing a quantitative analysis of the visuals in the corpus, based on literature on CP visuals. The quantitative part measures how many visuals are used and investigates their periodicities and semiotic types. We are also providing a qualitative part, in which some of the figures are discussed and additional observations are made. Our main research questions (RQ) are:

- (1) How prominent is the visual channel in TED Talks in the category science compared to CPs?
- (2) Which types of visuals are used in academic TED Talks compared to CPs?
- (3) To what extent is the use of visuals in TED similar to the use of visuals in CPs (scientific category)?

The second chapter comprises the theoretical framework for the research. It discusses genre theory, visual communication, CPs and TED Talks presentations. Subsequently, in chapter three, we provide detail on the selection of the videos for the corpus and the analysis method and approach. Chapter four discusses the results of the qualitative and quantitative analyses. In the final chapter we review the main findings of the research.

2. THEORETICAL FRAMEWORK

This chapter comprises the theoretical framework for the research. In this chapter, we elaborate on the theoretical background. Subsequent chapters concentrate on the methodology and examination of the results. In the first part of this chapter, we use the concept of genre theory to compare CPs and TED Talks. Genre theory is a useful framework for examining CPs and TED Talks, as it enables us to discuss the similarities and dissimilarities between these two forms of presentations. In the second part, we focus on visual semiotic resources in general, in CPs and in TED talks.

2.1 Genre theory

The first question is what a CP genre is and how TED talks and CPs compare. In order to answer these questions, it is useful to examine the concept of genre theory, as it provides us with the theory to make a valid comparison.

The concept of genre has evolved from traditional definitions in literary studies focusing on form and content to a much broader and dynamic view, which seeks to take the complex nature of communication into consideration (Freedman & Medway, 1994). While form and content are still important considerations, genres are communicative events and have to be investigated with attention to their social nature and communicative purpose (Swales 1990, Bhatia 1993, 1997). According to Bhatia (2002: 4) "genre analysis is often viewed as the study of situated linguistic behaviour". An often-cited definition of genre is the one by Swales, one of the main researchers of genre analysis. He acknowledges the importance of social aspects and defines genre as

a class of communicative events, the members of which share some set of communicative purposes. These purposes are recognized by the expert members of the parent discourse community, and thereby constitute the rationale of the genre. This rationale shapes the schematic structure of the discourse and influences and constrains choice of content and style. (Swales 1990: 58)

In this definition, Swales recognises the importance of discourse community and communicative purpose. Ventola underlines the importance of taking contextual features into account. She emphasises the importance of "studying conferences as a social event

comprising interrelated genres. These arise in a particular context, and the unfolding of their generic structures cannot fully be understood without taking that social context into account” (Ventola 2002: 9).

Genres are not static. Rather they are continuously evolving, which makes it more difficult to classify them in a definitive sense. However, a genre is by definition composed of a number of features and characteristics common to examples of the given type.

2.2 CPs in terms of genre

This chapter aims at defining and characterising the CP genre, including the four main elements of genre discussed previously: form, communicative purpose, discourse community and context. As a starting point, we use a definition by Carter-Thomas and Rowley-Jolivet, who describe a conference presentation as “an extended monologue of informational discourse, with a logical hierarchal structure. It is also, however, interactional discourse, which takes place at a specific time and place, and before a live audience.” (Carter-Thomas & Rowley-Jolivet 2005: 98)

A CP cannot be adequately discussed without mentioning its conference context. The CP is a monologue that is shared in front of a live audience. The contextual features of the live CP are of importance as they exert certain constraints (e.g., constraints in time, use of language, density of information) on the CP genre and the use of visuals. We will discuss the example of use of language. The more formal, academic style and language of the research article are adapted to the spoken context of the CP genre. An example of this is the lower use of complex noun groups and nominalisation in the CP (Rowley-Jolivet & Carter-Thomas 2005: 59).

Swales points out additional contextual elements of the CP:

the travel to and from the venue, the meeting of old friends and the making of new acquaintances, the plenaries, receptions, and book exhibits, and the intangibles of the conference ‘buzz’ – its taut intellectual atmosphere, its rush from one talk to another, its gossip, its job interviews, its hot topics, and its ‘in’ people (Swales 2004: 197).

Conference presentations are of importance for the specific academic community and the main focus of interest is the research. According to Rowley-Jolivet, “a major function of many conference presentations is to present work-in-progress or “proto-claims” with a high novelty value” (Rowley-Jolivet & Carter-Thomas 2005: 52). The conference presentation’s main communicative purpose is to inform the audience of ongoing research, preferably with a high novelty value. CPs are an important context in which researchers promote their work to and persuade peer audiences (Rowley-Jolivet & Carter-Thomas 2005c: 296). Last, because the CP takes place in front of a live audience and is a social event, the interactional function (i.e., creating a connection with the audience) has to be considered.

The audience generally comprises peer researchers who have shared visual knowledge of the field, which extends to expected visuals and taxonomies. “Participants share, however, a disciplinary identity, and come together at the conference with a common aim, in which the scientific research [...] is the main focus of interest” (Rowley-Jolivet & Carter-Thomas, 2005c: 296).

2.3 TED in terms of genre

The basis for the corpus is the Internet website of the organisation TED. Details of the selection process can be found in the methodology chapter. To gain a deeper understanding, it is worth mentioning and comparing the characteristics of TED presentations with the features of academic CPs. We focus on form, communicative purpose, discourse community and context, while also mentioning some other general and significant characteristics.

There are some similarities in form, context and communicative purpose between TED and CPs. As mentioned earlier, a CP is defined by Carter-Thomas & Rowley-Jolivet as an “extended monologue of informational discourse, with a logical hierarchal structure” (2005: 98). This definition is also applicable to TED. Carter-Thomas and Rowley-Jolivet continue their definition as follows: “It is also, however, interactional discourse, which takes place at a specific time and place, and before a live audience”(Carter-Thomas & Rowley-Jolivet, 2005: 98).

TED holds live conferences in front of live audiences. In other words, TED has the same live conference context as CPs. Therefore both communicative events can be characterised as “interactional discourse” taking place “in front of a live audience”. The discourse in TED Talks is interactional, and the same possibility for interaction takes place during CPs (e.g., Q&A sessions and informal contact between conference participants). Nevertheless, there is an additional channel for this interaction at TED. Migration to the web takes place; the presentations are posted on the TED site, which makes them accessible to a very broad public. This means that there is the possibility for feedback not only during the talk, but at a later time as well, by means of comments on the video, spreading of the videos on social media, etc. The purpose of TED Talks is to inform the audience, to persuade, to inspire, to disseminate ideas and knowledge, and to entertain.

Moreover, according to research for a Masters paper performed by Barbier (2013), the rhetorical structure of TED presentations is similar to that of CPs. Barbier (2013: 15) suggests that TED Presentations could “be regarded as some sort of subcategory within the CP genre”.

Nevertheless, we also note some dissimilarities. Many of these distinctions are related to differences in discourse community. The composition of the audience is different in TED conferences than in CPs, a pivotal difference. The CP audience consists of specialised academics, whereas the audience of TED Talks is mainly non-specialised and broader. Due to the posting of the videos on the website, there is also an online audience for TED. The online views take place at a later time, after the video has been edited and uploaded. The online videos are more accessible than the conferences themselves, where occasionally a waiting list is used and an entrance fee is charged³. Furthermore, since 2009 subtitles are added to the online videos⁴, which also makes them accessible for a large non-English speaking audience.

The TED target audience is a lay audience with little background knowledge. It consists of people from different backgrounds, different fields and with different educational levels, but with a common interest, namely learning about new ideas. TED advises speakers to use little jargon and to “explain new terminology” in a speaker guide for TEDx events⁵. “The primary

³ The entrance price depends on the type of event. Tickets for TEDGlobal events cost \$6,000. Prices for TEDx events are lower and can range from \$0 to \$100. (<http://www.ted.com/participate/organize-a-local-tedx-event/>)

⁴ All online talks are in English. Subtitles are available in 105 languages. Not all videos offer subtitles in all languages. (<http://www.ted.com>)

⁵ <http://storage.ted.com/tedx/manuals/tedxspeakerguide.pdf> [25.07.2014]

goal of your talk is to communicate an idea effectively to a smart lay audience⁶ (emphasis added)

Second, TED offers a very wide range of talks in different topics and fields, such as technology, entertainment, design, business, global issues and science. Some TED talks aim at providing thought-provoking entertainment; this stands in stark contrast with the CP, where the main focus is always the scientific research. While most academic conferences are field specific, TED conferences are mostly field transcending. TED conferences generally feature talks about varying topics from entirely different fields are given (although often with an underlying theme). In conclusion, the range of topics and fields of TED is much broader. An important remark here is that in both TED and CPs, the novelty value of the information is important, something that is present in TED's commitment to "ideas worth spreading".

As shown above, there are some significant similarities between TED Talks and CPs, especially for talks in the category science. Nevertheless, considering the similarities and dissimilarities, we cannot state with confidence whether it should be regarded as some sort of subcategory of the CP genre, as suggested by Barbier (2013). Migration to the web induces some changes in traditional genres. The emergence of new online platforms (e.g., YouTube, TED) and genres has offered possibilities, but also challenges to the practise of genre analysis. We argue that TED as a genre should be placed in between academic spoken genres and popular online genres. TED shows some characteristics of both online genres and popularised science genres. We argue that TED talks in the science category can be seen as a sort of popularisation of scientific information. Calsamiglia and Van Dijck provided a clear definition of popularisation:

A vast class of various types of communicative events or genres that involve the transformation of specialized knowledge into 'everyday' or 'lay' knowledge, as well as a recontextualization of scientific discourse, for instance, in the realm of the public discourses of the mass media or other institutions. (Calsamiglia & Van Dijck, 2004: 370, emphasis added)

Sugimoto and Thelwall (2013: 663) observed that the non-specialised audience is relying increasingly on the Internet for popularised information about science, while their main sources of information used to be traditional media, such as magazines, newspaper, radio and television. They regard popularisation as "the wide dissemination of scientific information to

⁶ <http://storage.ted.com/tedx/manuals/tedxspeakerguide.pdf> [25.07.2014]

a non-specialized public” (Sugimoto & Thelwall, 2013: 663) TED’s goal to disseminate “ideas worth spreading” to the non-specialist audience seems to correspond to the notion of popularisation. However, to enable a definite statement on TED as a genre, more research is necessary. Our aim is to make a contribution to the research by performing an analysis of the visuals from the talks closest to CPs and comparing them to the existing research on visuals in CPs.

In the next section, we focus on the visual dimension of both TED and CPs. Before doing this, we provide some theory on visual resources.

2.4 Visual communication

Human communication is multimodal; in discourse, different semiotic modes are combined to create meaning. A logical distinction is that between linguistic and non-linguistic communication. In addition to language, there are other semiotic resources such as visual, gestural, musical, actional and paralinguistic. Van Leeuwen (2005:285) defines semiotic resources as

the actions, materials and artefacts we use for communicative purposes, whether produced physiologically [...] or technologically [...] together with the ways in which these resources can be organized. Semiotic resources have a meaning potential, based on their possible uses, and these will be actualized in concrete social contexts where their use is subject to some form of semiotic regime. (Van Leeuwen, 2005:285)

Visual resources are not just a complementary element of verbal language; they can also fulfil functions of meaning-making. As with verbal resources, they enable human beings to build a mental picture of reality, helping them to make sense of their experience of what goes on around them and inside them (Kress & Van Leeuwen, 1996).

The meanings which can be realized in language and in visual communication overlap in part, that is, some things can be said only visually, others only verbally. But even when something can be said both verbally and visually, the way in which it will be said is different. For instance, what is expressed in language through the choice between different word classes and semantic structures, is, in visual communication, expressed through the choice between, for instance, different uses of colour, or different compositional structures. (Kress & Van Leeuwen, 1996:2)

Visual semiotics are more convenient than verbal language when it comes to expressing certain relationships. Lemke identifies these relationships as (1998: 6) “degree, quantity,

graduation, continuous change, continuous co-variation, non-integer ratio, varying proportionality, complex topological relations of relative nearness or connectedness, the interpenetration of different dimensionalities, or nonlinear relationships and dynamical emergence.”

New technologies have changed the way in which we communicate, and the importance of visual language has been increasing in recent decades. Lester observes in “Syntactic theory of visual communication” that we are becoming a “visually mediated society”. He noted that “For many, understanding of the world is being accomplished, not through words, but by reading images.” (Lester 2006)

This does not imply, however, that all genres use images. The importance of the visual dimension varies across genres. As stated earlier, the visual dimension is prominent in academic discourse (see also section 2.5 for further discussion).

Visual communication is cultural. Visuals are not universally understood; they are produced within cultural and social frameworks. Members of a culture often do not recognise the characteristics of their own culture, nor do they realise that certain visuals are culture specific. (Kress & Van Leeuwen 1996, Rowley-Jolivet 2000, Miller 1998)

This general cultural context which shapes how a given culture visualises the world around it often remains invisible to the members themselves: their culture’s forms of visualisation are taken for granted as being the only natural ones conceivable. (Rowley-Jolivet, 2000: 136)

This also applies to pictures: certain pictures are standard and regularly used for particular subjects in a culture, while, theoretically, they could be represented visually in many different ways (Gould, 1997:41). It is not only cultures that have a specific use of visuals and visualisation, but also esoteric groups (e.g. scientific communities). Researchers have acquired knowledge of the typical use of visuals over the years and know how to interpret the provided data or graphs.

2.5 Visuals in CPs

The CP genre has a multimodal nature; multiple semiotic resources (mainly language and visual semiotics) are used in order to make meaning. Even though some research into the linguistic, pragmatic and structural aspects of the CP genre has been done (Carter-Thomas & Rowley-Jolivet 2005, Räisänen 2002, Shalom 1993, 2002, Swales 2004, Ventola 1999, 2002, Webber 2002), research into the visuals of CPs remains limited to a small number of studies (Dubois 1980, Rowley-Jolivet 2000, 2002, 2004, Degano 2012, Charles & Ventola 2002). One of the first researchers to study the multi-semiotic CP genre from a linguistic point of view was Dubois, who, in the early 1980s, studied biomedical CPs as well as posters sessions at biomedical conferences. She investigated the use of slides in biomedical speeches and argued that slides play a prominent role in these presentations: “In addition to providing visual interest and reinforcement of key points, they carry the crucial information of the body of the speech, information which is often not imparted orally by the speaker”(Dubois, 1980: 50).

The visual medium is drawn upon frequently during conference presentations. As noted by Rowley-Jolivet:

In the scientific conference presentation, whatever the discipline, the visual channel is a major resource for meaning-making: visuals are omnipresent throughout the talks given, with slides or transparencies being continuously projected onto the screen during the speaker’s monologue. Any investigation of how the conference presentation genre makes meaning must therefore address its visual dimension. (Rowley-Jolivet 2000: 133)

Currently, Rowley-Jolivet is one of the key researchers in this area. She has investigated CPs and conference visuals by means of a corpus of 90 CPs in the fields of Geology, Medicine and Physics. She performed quantitative and qualitative analyses of the visual channel (see also chapter 3.2). She has emphasized the importance and presence of visuals in academic discourse: “The visual display is in fact the common focus of attention for both speaker and audience, as many aspects of scientific phenomena can only be communicated visually.” (Rowley-Jolivet, 2005: 63)

As Rowley-Jolivet noted, visuals are often used to communicate scientific phenomena in CPs. They are a key semiotic mode for supporting the claim-making in scientific discourse, both in general and in CPs (Bastide 1990, Miller 1998, Rowley-Jolivet). Miller states that “the most important use of the visuals in academic texts is to support the argument.” (1998: 32). In scientific articles, visuals are included in order to convince the readers of the validity of the

argument and findings and allow them to interpret and examine the data themselves (Miller, 1998).

Aside from expected scientific imagery such as diagrams, tables and charts, slides often contain scriptural and figurative visuals (i.e., information in ordinary language and photographs) (Dubois, 1980, Rowlet-Jolivet 2002). Some of these photographs are similar to “popular imagery” (Rowley-Jolivet 2002). This can be attributed to the looser atmosphere and the need for interaction during the live presentation. The interactional metafunction is important in the conference context, where establishing a connection with the audience is key. In some cases, speakers use non-technical arguments to help convince the audience in oral presentations (Dubois 1980). However, these visual elements are not used for argumentation or to present the research results, but rather to exemplify or enhance the presentation.

Additionally, visual resources regularly support the structure of the conference presentation and help guide the audience through the talk. For example, titles and subtitles may appear on top of the slides. Some visuals are associated with different parts of the talk as well (see also chapter 3.2 for more information on sequences).

2.6 Visual channel in TED

This section discusses the visual channel of TED. To the best of our knowledge, no academic research has been published on the visual channel of TED. Nevertheless, we are commenting some information from other sources and our expectations.

Speakers receive guidelines and training from the organisers of the events. Before TEDx events (locally organised events), speakers receive a “speaker guide”⁷ and “speaker briefing” document⁸. We have listed the most important guidelines on slide usage in the figure below. These documents advise the speakers regarding the content, introduction, use of slides, and so forth.

⁷ <http://storage.ted.com/tedx/manuals/tedxspeakerguide.pdf>

⁸ <http://www.ted.com/participate/organize-a-local-tedx-event/tedx-organizer-guide/speakers-program/prepare-your-speaker>

Examples of TEDx guidelines on slides
<p>Should I use slides? <u>Slides can be helpful for the audience, but they are by no means necessary or relevant to every talk.</u> Ask yourself: Would my slides help and clarify information for the audience, or would they distract and confuse them? Some great examples of slides can be found in the talks by [...]. The most important rule for slides: Keep it simple.</p>
<p>What goes in my slides? Images and photos: To help the audience remember a person, place or thing you mention, you might use images or photos. People will understand that the images represent what you're saying, so there is no need to verbally describe the images onscreen. Graphs and infographics <u>Keep graphs visually clear, even if the content is complex.</u> Each graph should make only one point. No slide should support more than one point.</p>
<p>What should the slides look like? Use as little text as possible -- if your audience is reading, they are not listening. Avoid using bullet points. Consider putting different points on different slides.</p>

Figure 2: examples of TEDx guidelines on slide usage⁹

The slides are reviewed and need to be approved by the organisers of the event prior to the talk. Speakers cannot use transparencies, Prezi or other presentation software; only PowerPoint and Keynote presentations are accepted. Consequently, no other formats are used in the talks. Speakers are advised to use as little text as possible in the slides and to use graphs, images and photographs. The images and photographs can “help the audience remember a person, place or thing you mention”. The graphs should be simple and visually clear.

This dissertation investigates the visual channel in TED talks in the category science compared to CPs. The term *visual* is ambiguous, as it can refer to different elements. Slides, photographs, images, objects and body language could form the focus of studies on the visual channel of TED. Our analysis focuses on visual aids in the form of slides, transparencies or PowerPoint presentations; other visual resources will not be broached. Consequently, when talking about “the visuals”, we are referring to these slides, PowerPoint presentations and transparencies. This study aims at providing a general image that can offer some insight and preliminary findings into the use of visuals in TED.

⁹ <http://storage.ted.com/tedx/manuals/tedxspeakerguide.pdf>

Based on the preceding, we have come to the following hypotheses. The CP audience comprises specialised academics, proficient at reading the specific visuals of their field. TED's reach is much broader than that of CPs, attracting an audience that is mainly non-specialised. We therefore expect that simplification of visuals will take place. We hypothesise that fewer technical visuals (charts, diagrams, mathematical formulae and graphs) are used compared to CPs.

Secondly, we expect that in TED the visual channel is used differently. We expect to find more photographs, use of humour and visuals aimed at entertaining the audience.

3 METHODOLOGY

3.1 Corpus selection

The corpus used for this study comprises 12 videos of presentations that were held at multiple TED conferences and events and uploaded on the website www.ted.com. The presentations were given between August 2009 and January 2013. From a list of 27 talks that answered our research criteria, 12 TED Talks were selected. The overall purpose was to compile a corpus that would closely reflect the CP genre, as determined by specific selection criteria. TED organizes its online videos using various descriptive category titles, which include technology, science, design, entertainment, business and global issues. The videos are rated by viewers as jaw-dropping, persuasive, courageous, ingenious, fascinating, inspiring, beautiful, funny or informative. For our research, only videos in the category *science* and rated as *informative* were considered suitable, as they bear the closest resemblance to CPs. Additionally, we verified the academic background of the selected speakers because we considered only talks by academic speakers to be fitting for the category *science*.

Furthermore, only videos conducted by native speakers were used. By focusing on native speakers at this initial stage of research, we hoped to avoid possible language barriers and cultural variations influencing the use of visuals. The length of the selected videos varies between 14 and 20 minutes, which is also the typical length for the CPs. This resulted in a corpus consisting of the following 12 videos.

	Title	Speaker	Field
A	The single biggest health treat women face	Noel Bairey Merz	Medicine
B	The origins of pleasure	Paul Bloom	Psychology
C	Discovering ancient climates in ocean and ice	Rob Dunbar	Biogeochemistry
D	The dance of the dung beetle	Marcus Byrne	Biology
E	Can the damaged brain repair itself?	Siddharthan Chandran	Medicine—neurology
F	Meet your microbes	Jonathan Eisen	Biology
G	The mysterious workings of the adolescent brain	Sarah Jayne-Blakemore	Medicine—neurology
H	The puzzle of motivation	Dan Pink	Psychology
I	The optimism bias	Tali Sharot	Psychology
J	How a fly flies	Michael Dickinson	Biology
K	How to spot a liar	Pamela Meyer	Psychology
L	Re-engineering mosquitos to fight disease	Hadyn Parry	Biotechnology

3.2 ANALYSIS METHODOLOGY

For this study, both a quantitative and a qualitative descriptive analysis were conducted on the corpus of 12 TED presentations. All videos were watched two times or more and their visuals were extracted by making screenshots, which can be found in appendix 2. These visuals were manually analysed on different parameters: periodicity, average number of visuals, semiotic type, function and part of talk. The quantitative analysis aims at identifying how often and which types of visuals are used in TED presentations. Although this quantitative measurement cannot be considered exhaustive, as it concerns a relatively small corpus, the observations can give us an idea of the importance of the visual channel in TED Talks in the science category. In the qualitative analysis, the use of the visuals is analysed in more detail and some observations are made about the function of the visuals. The collected data are compared to the figures in CPs, as found in Rowley-Jolivet (2000, 2002) in a corpus study of 90 presentations in the fields of medicine, geology and physics. At the time of writing these are the only quantitative research data available on visuals in CPs that are suitable for comparison. The results of the analyses are discussed in chapter 4.

3.2.1 Quantitative analysis

First, the number of slides and the average periodicity of the slides were examined. The periodicity was measured by dividing the total length of presentations (in seconds) by the total number of visuals. By measuring how many visuals are used on average, we might have an idea of the prominence of the visual channel in TED and be able to compare it to CPs. Rowley-Jolivet (2000) showed that in CPs the visual channel is regularly drawn upon, with an average of one slide every 51 seconds.

Second, for each slide, the semiotic type was identified. For this purpose, we utilised an adaptation of the four-part typology used by Rowley-Jolivet (2000, 2002) following Lemke (1998). She distinguished three main semiotic types: visual, scriptural and mathematical. For each of these categories, a description is provided below.

The scriptural category comprises linguistic semiotic elements, such as titles, conclusions, and quotes. In CPs, text (scriptural) and photographs (figurative I) are commonly used in the

slides, while in the corresponding research articles these types of visuals are hardly found (Rowley-Jolivet 2004, Dubois, 1980). Generally, visuals and graphs in CPs are less complex and have a lower density of information than in research articles.

Mathematical or numerical visuals are monosemic and include numerical tables and mathematical formulae. Mathematical and graphical visuals are typically used in scientific discourse to support claim-making and argumentation.

The visual type can be further subdivided into graphical and figurative visuals. Elements such as graphs, charts, maps, sketches and diagrams adhere to the monosemic, graphical category. Approximately one-third of the visuals in CPs are graphical. The figurative visuals, which are polysemic, are mainly photographs. Photographs can differ in photographic technique, and therefore the figurative category is subdivided into figurative I and II. While figurative I visuals are ordinary photographs (e.g., study objects, tools), in figurative II images have been adapted by means of “sophisticated photographic techniques to enhance the image and highlight a single feature of the real object” (Rowley-Jolivet 2002: 27). Examples of these are science-related images such as X-ray scans, CT scans, MRIs and enlarged images. Table 1 shows Rowley-Jolivet’s detailed findings on the average periodicity and semiotic types in CPs.

	Geology	Medicine	Physics	Average
Periodicity (in seconds)	46.5	39.6	66.5	51
Semiotic type (in %):				
Linguistic (Scriptural)	11	26.8	30.4	22.9
Mathematical (Numerical)	5.2	26.5	17.6	17.9
Visual (Figurative- Graphical)	83.8	46.7	52	59.2
Total (n = 2048)	100%	100%	100%	100%

Table 1. Periodicity and semiotic types of visuals in conference presentations (Rowley-Jolivet, 2000: 133)

Some slides contain elements from different categories or subcategories, e.g. the visual and the linguistic. Therefore, they are more difficult to classify. When this was the case, the slides were examined in detail and the main or most relevant type was selected. The number of

hybrid slides was also measured and the second or third types classified. There are no data available on the phenomenon of hybrid slides in CPs, but we suspect that hybrid slides might be used as well. An example of this could be the combination of a table or graph and written text with mention of the researchers.

3.2.2 Qualitative analysis

In the qualitative part of the analysis, we are investigating how the visuals are used in TED Talks and to what extent their use is similar to the use in CPs. For this purpose, we are discussing the figures of the quantitative analysis more in-depth and several different aspects of the visuals and their use. As stated earlier, the difference between the TED and CP discourse community is crucial. In CP discourse, conference participants have an extensive shared visual knowledge. Rowley-Jolivet defined this knowledge of the specialist audience in six strata of shared visual knowledge (2000). It is interesting to use these six strata, because they provide us more information about the foreknowledge of the CP audience. The foreknowledge is a pivotal difference with TED's lay audience. We are discussing the six strata in CPs and explain how we can look at these six aspects in TED. These six strata are technical, compositional, interpretational, spatial, sequential and rhetorical knowledge. The first three strata are linked, and we discuss them together.

3.2.2.1 Technical, compositional and interpretational

Firstly, conference participants in CPs share technical visual knowledge. They know how to use and interpret certain field-specific, photographic techniques of visualisation. They also know what the purpose of the technique is and what to expect when the technique is used. "These techniques of visualisation are mostly linked to the objects of study, the methods of investigation or the epistemology of the field" (Rowley-Jolivet 2000: 40). Academics have acquired technical knowledge during years of studying their field, first as students and later as researchers. In medicine, for example, scientists know how to interpret MRI scans and what to look for if they are shown (Rowley-Jolivet 2000: 41).

The second stratum, compositional knowledge, refers to "monosemic constructed visuals whose conventions have been developed within the field or speciality" (Rowley-Jolivet 2000:

41). This includes graphs, diagrams, charts and other similar visuals. The main difference between technical and compositional knowledge is that technical refers to photographic techniques whereas compositional focuses on graphical visuals.

Thirdly, interpretational knowledge refers to the conference participants' interpretational skills in reading the visuals. A specialist, after having acquired a certain expertise and a certain degree of compositional and technical knowledge, is able to not only interpret and detect the crucial information, but also predict what certain visuals will look like. Experts are capable of investigating the data themselves and locating inaccuracies. Naturally, the interpretational skills of a non-specialised audience are less developed than those of specialised academics. In the case of CPs, the audience has spent years studying the area and has acquired a high level of knowledge of the strata described above. This is a long and steady process. The acquired visual knowledge of the specialist audience results in a shorter mental processing time when specific types of images are shown (Rowley-Jolivet 2000). In TED Talks, on the contrary, the audience has little foreknowledge, and the speaker has 18 minutes to convey the information. When looking at TED Talks, we examine whether the speakers use technical slides. Is the composition simply enough for everyone to understand? We also comment the graphical images and their complexity. Are there complicated graphical images used?

3.2.2.2 Spatial

The spatial component is present in presentations with double-screen projection only and concerns the logical relationship and interaction between the two screens. This function is not relevant for TED Talks because the format does not utilise double screens. Consequently, this study will not analyse the spatial component. (Rowley-Jolivet 2000)

3.2.2.3 Sequential

There are some series of visuals commonly used in CPs, for example, an overview slide at the beginning or graphical slides when discussing the results. We examine whether there is a typical sequence of visuals associated with certain parts of TED talks, and the extent to which presentations move away from predictable sequences.

3.2.2.4 Rhetorical

The rhetorical category encompasses claim-making, the argumentation and the way in which the argument is built during CPs, especially by means of the visuals. The data can be visually presented in a certain way to support a hypothesis. In CPs academics usually present their data in a way that makes it compelling for the audience. They can use different techniques for this purpose. For example, to make the results visually more perceivable, they can simplify or filter the ‘noisy’ data (Rowley-Jolivet 2000). As described in section 2.5, visuals in CPs are important for claim-making. Presenters have to provide convincing proof for the claims made. The visual medium is more convenient for this than spoken language is, as more data can be communicated and data can be more easily interpreted than in spoken language (e.g. tables, graphs). We look at the claim-making and the argumentation behind the claims made in TED Talks.

While performing the research, we were confronted with visuals that did not correspond to any of the six categories. Some visuals mainly functioned for entertainment purposes. Because of this observation, we were obliged to create an additional category: entertainment.

3.2.2.5 Entertainment

An additional category is the entertainment category. TED talks aim at inspiring people, and in this popularised-science platform, provoking emotions and entertaining the audience might be more important than in CPs. We examine whether the visuals are used to provoke emotions, entertain or attract the reader’s attention and comment the entertainment factor of the talks.

The difficulty is to understand the purpose and added value of these visuals. In some cases the difference between slides that aim at entertaining the audience and slides that aim at capturing the audience’s attention is unclear. Entertaining slides can be helpful in the retention process and give the presenter a sympathetic image.

These strata are discussed in the results section. Nevertheless, our aim is not to define similar strata for TED, rather to use these strata as the basis for a discussion.

4. RESULTS

4.1 Quantitative analysis

This chapter discusses the results of our corpus study. In the 12 TED Talks, 261 slides were found in total. The slides were analysed on different variables in order to answer the three postulated research questions. The quantitative analysis allows us to investigate our first two research questions. The periodicity and average number of visuals were measured to answer our first research question on the prominence of the visual channel in TED Talks. The second research question requires investigation into the types of visuals used in TED. We examined the different semiotic types used in the TED Talks and compared these to CPs. The qualitative analysis addresses the third research question investigating to what extent the use of visuals is similar in TED and CPs.

4.1.1 Periodicity

First, the number of slides and the average periodicity of the slides were examined. The periodicity was measured by dividing the total length of the 12 talks (in seconds) by the total number of visuals (=11,814/261). The periodicity is discussed in more detail, because it allows us to compare the number of visuals in the talks independent of the duration time of the complete talk and individual slides. The duration of the average TED talk is shorter (15'15") compared to that of the average CP, (19'33") and therefore the periodicity is more suitable for comparison. Table 2 presents the periodicity and number of visuals in TED talks, compared to the average in CPs, as described in Rowley-Jolivet (2000: 133).

	Average TED talk	Average CP
Periodicity (in seconds)	45	51
Average number of slides per presentation	22	23

Table 2: Number and periodicity in TED Talks versus CPs.

Our results show a high periodicity of visuals in TED Talks, with an average of one slide every 45 seconds. This means that on average one slide is shown every 45 seconds. This figure is comparable to the average periodicity of 51 seconds in CPs, a figure found by Rowley-Jolivet in her corpus study (2000). This suggests that, in the science category, the visual channel is prominent in TED Talks, as it is in CPs.

In table 3, the detailed periodicity and number of visuals per TED Talk can be distinguished. Studying the detailed periodicity is interesting, because the 12 TED talks differed greatly in their use of visuals. In some TED Talks, a higher number of visuals was found. In one of the TED talks (talk F), no visuals were used at all.

Talk	Number of visuals	Periodicity in seconds
A: The single biggest health treat women face	15	64
B: The origins of pleasure	50	20
C: Discovering ancient climates in ocean and ice	27	41
D: The dance of the dung beetle	32	32
E: Can the damaged brain repair itself?	15	64
F: Meet your microbes	0	–
G: The mysterious workings of the adolescent brain	9	96
H: The puzzle of motivation	13	86
I: The optimism bias	29	36
J: How a fly flies	26	37
K: How to spot a liar	38	30
L: Re-engineering mosquitos to fight disease	5	167
Average TED Talk	22	46
Minimum/maximum in TED Talks	0/50	20/167
Minimum/maximum in CPs	4/88	13/202

Table 3: Average periodicity and number of visuals per TED talk.

As noted earlier, the visual channel is drawn upon frequently by TED speakers and is a major resource for meaning-making. There is one exception. In one of our 12 analysed talks (talk F “meet your microbes”), no slides were used at all. Slides do not need to be used necessarily, slides are helpful, but not “relevant to every talk”, as TED advises in its speaker guide (TED

speaker guide: 5). The slide usage varies; it is not necessary to use slides in TED Talks. In the CP corpus of Rowley-Jolivet, all 90 talks contained slides or transparencies.

The other presentations did contain slides, ranging from 5 to 50 slides per talk; this equated to 1 slide every 167 seconds in the former and 1 slide every 20 seconds in the latter. This is a wide range, but it is comparable to the range found in CPs by Rowley-Jolivet (2000), which ranges from 1 slide every 202 seconds to 1 slide every 13 seconds.

Furthermore, the number of slides per presentation in the TED Talks' corpus was comparable to that of the CPs. The average number of slides per presentation was 22 for TED Talks and 23 for CPs. The high number and periodicity of the visuals imply that the visual channel is prominent in TED talks in the science category.

4.1.2 Types of visuals

This section discusses the different types of visuals. The aim of this part is investigating which types of visuals are used in TED Talks. In this section, we are discussing visual, figurative I and II, graphical, scriptural, mathematical, and lastly hybrid slides. Table 4 presents the distribution of the different semiotic types in TED compared to CPs. The data for the CP were found in Rowley-Jolivet (2000: 133).

Semiotic type (in %):	TED	CP
Linguistic (Scriptural)	19.6%	23.0%
Mathematical (Numerical)	0%	17.9%
Visual (Figurative- Graphical)	80.4%	59.2%
Total	100%	100%

Table 4. Semiotic types in TED versus CPs

4.1.2.1 Visual semiotic type

The results show that in both TED talks the visual is the most important and most used semiotic mode. It counts for 80.4 % of the slides in TED talks, which is a very high percentage, against 59.2% in the CP. Some differences were found between the use of visuals

in TED and CPs. Table 5 shows a detailed distribution of the different subtypes of the visual type. The CP data were found in Rowley-Jolivet (2002: 29).

Semiotic type (in %):	TED	CP
Visual	80.4%	59.2%
Figurative	67.4%	25.5%
Figurative I	57.1%	15%
Figurative II	10.3%	10.5%
Graphical	13.0%	33.6%

Table 5. Detailed distribution of the visual semiotic type.

There are more figurative slides in the analysed TED Talks than in CPs. Especially in the figurative I subcategory, the difference is noteworthy: 57.1% in TED against only 15% in the CP corpus. More than half of the slides make meaning drawing on the figurative I. Different types of figurative slides were found: photographs of phenomena and study objects, but also cartoons and photographs of people. These slides have different purposes. Some photographs are used to draw the attention of the audience, others to explain something or exemplify. The high number of photographs supports our second hypothesis to see more figurative I slides. More information and commentary follows in the qualitative analysis.

Approximately 10% of the slides are figurative II. These slides included MRI scans, CT scans and enlarged images. The percentage and use in the analysed TED Talks is comparable to CPs.

Furthermore, as can be concluded from the table, the number of graphical slides used in TED (13.0%) is significantly lower than in CPs (33.6%). A large part of slides in this category are graphs. The graphical slides in TED are not often complex and difficult. Their complexity is understandable for a lay audience. More information on this can be found in the qualitative analysis.

4.1.2.2 Scriptural semiotic type

The percentage of scriptural slides in TED (19.6%) is close to that of CPs (22.9%) and their use is similar. In TED Talks, most of the scriptural slides do not contain large blocks of text. The table below compares the word density of the scriptural slides in CPs and TED. The CP data were found in Rowley-Jolivet (2002:26).

	TED corpus	CP
Average number of words/slide (only in scriptural)	13	31

Table 6. Word count in scriptural slides.

The average number of words in the scriptural slides is 13 words, a low figure, and the average number of tokens is 66. The average word density of TED is more than two times lower than CPs' word density. They are mainly used for citations, titles, surprising points, short remarks and examples. Scriptural slides are useful to help structure the talk. They are regularly found in the introduction and closing of a talk and therefore act as framing or closing devices. An example is the talk by Rob Dunbar, where the last slide contains a scriptural conclusion:



Slide C27

Other examples of scriptural last slides can be found in the slides B50, where a quote is used. In J26, the speaker, based on the preceding, asks the public to “think before they swat”. This line refers to the content of the talk (the wonders of a fruit fly’s brain and its ability to fly). It also contains an element of humour and could even be considered an attempt at persuading the audience (see appendix 2).

4.1.2.3 Mathematical semiotic type

Surprisingly, in the TED Talks no mathematical visuals were found (0%). This is a significant difference with CPs, where 17.9% of the visuals were mathematical. In TED Talks, mathematical formulae and equations were not regularly visualised in presentations for the non-specialist audience. A possible explanation can be found in the differences in the audience and purpose of the talk. This is explained in the following qualitative section.

Finally, about half of the slides are hybrid; these visuals communicate by means of various semiotic modes. A common combination of modes is scriptural-visual; 38.3 % of slides in TED Talks combine the visual semiotic mode (as main type) with written text. This sheds a new light on our data on the use of the scriptural category. The total use of the scriptural category is much higher than our data discussed above indicated. If we count all the slides (also second and third types), the scriptural category is actually present in 57.8% of the total number of slides. In the majority of these slides, the textual elements do not play a major role. The hybrid scriptural slides are used for different purposes. They are commonly used in the titles of the slide, in references to researchers (e.g. of a theory or experiment), to illustrate something or to add a small comment or description. When combined with graphical slides, they often state what is being analysed.

	2nd or 3rd
Second or third semiotic type (in %):	semiotic type
	TED
Linguistic (Scriptural)	38.3%
Mathematical (Numerical)	0.4%
Visual (Figurative- Graphical)	14.6%
Figurative I	9.6%
Figurative II	1.9%
Graphical	3%

Table 7. Semiotic types in second and third semiotic type of the slides in TED

One hybrid slide made use of the mathematical semiotic type, slide J10. Its main type is not mathematical, but an equation is made by means of the symbol $<$. This was the only slide in which the mathematical category was found. Furthermore, in addition to the visual-scriptural, different combinations were found: Figurative I - graphical, figurative II - graphical, and so forth. There are no data available on the number of hybrid slides in the CP corpus, but we imagine that a similar phenomenon does occur.

4.2 Qualitative analysis

The qualitative analysis discusses the use of visuals in TED Talks more in-depth and examines our third research question: to what extent is the use of visuals in TED similar to the use of visuals in CPs (scientific category)? We also examine the shared visual knowledge of the TED audience compared to that of the CP audience.

Based on the preceding quantitative analysis, we argue that the visual channel is prominent in TED Talks in the science category. This is clearly supported by the figures found on periodicity. In the use of visuals, however, some dissimilarities were found between the two communicative events. Not only the low use of mathematical slides, the lower user of graphical slides and the higher use of figurative I, but also the lower text density in the scriptural slides confirmed our hypothesis that simplification would take place.

The rhetorical function is crucial in CPs, and the mathematical and graphical visuals support the claim-making. As stated earlier, the differences in audience and communicative purpose are crucial. They exert an influence on the content of the talk as well as the use of visuals. TED speakers with academic background adapt their talk to make it understandable for a smart lay audience, which has little background knowledge. The main aim of TED Talks is to inspire the non-specialist audience, whereas a CP aims at persuading the specialist audience of the asserted claims. To convince a specialist audience, providing clear and valid evidence is essential, while a non-specialist audience is generally less critical. While we are not saying that the rhetorical function is less important in TED, the argument is built differently. Visuals in TED are mainly used to attract, explain and to make the scientific information more tangible for the audience. This process of adaptation to a non-specialised audience is typically found in popularised genres. Calsamiglia and Van Dijck give some examples of strategies of explanation:

popularization discourse needs to be formulated in such a way that non-specialized readers are able to construct lay versions of specialized knowledge and integrate these with their existing knowledge. Thus, various strategies of explanation, such as definitions, examples, or metaphors, among many others, are the semantic means that allow language users to relate new knowledge to old knowledge. (2004: 370)

Miller (1998) found a similar process of popularisation when comparing the role of visual elements in articles from academic journals and their popularised counterparts in *Time*, *Newsweek* and the *New York Times*. He found that in popularisations, the visuals mostly do provide findings, but do not mention the proof of the original research article.

Visuals in the popularised version have a different function: to attract or explain rather than to prove. This could explain why ordinary photographs (figurative I) are used significantly more in TED Talks than in CPs (approximately 60% versus 15%). We compiled an overview table with frequently found examples of use of the different types and subtypes in TED Talks.

Type of visual	Examples of use
Scriptural	Titles of talk, slide titles, mention of authors or researchers, conclusions, citations, keywords, references
Mathematical	-
Visual	
Figurative I	Photographic representation of study objects, scientists, famous people or ordinary people, setting of experiment, equipment, cartoon, videos.
Figurative II	MRI scan, CT scan, enlarged photographs or videos
Graphical	Graphs, maps, diagrams, setting of the experiment, schematic representations, graphical representation

Table 8. Detailed distribution of the types in TED Talks

There were various examples of visuals projected in the TED Talks. Some of the examples of use (e.g., scriptural) have already been discussed earlier. We are focusing on the figurative I. Figurative I videos are videos of ordinary people. Not all videos in the corpus were classified as figurative I. Some videos adhere to the figurative II. In talk J, “How a fly flies”, a detailed video of a fly in a flight simulator was projected. Figurative I included photographs of study objects, but also of ordinary people and famous people, such as Britney Spears, George Clooney and Bill Clinton. Nevertheless, some ordinary photographs are used in CPs also. Rowley-Jolivet described the use of popular imagery in CPs (Rowley-Jolivet 2002). She

mentions that photographs are often used in the introduction of a talk, and emphasises that these photographs are “never used on the ideational plane to present the research results” (Rowley-Jolivet 2002: 29). In TED Talks, figurative I images are used in various parts of the talk, including when discussing results of research in the body of a talk.

Our figures suggest that the use popular images is much higher in TED than in CPs. TED speakers regularly use pictures of persons with whom the audience can identify. In other forms of popularisation, there is also often a tendency to use visuals that readers can identify with (Miller, 1998: 40). Consider the following examples from talk G and talk K.


Slide	Spoken commentary
	<p>So in my lab, we're interested in the social brain, that is the network of brain regions that we use to understand other people and to interact with other people. So I like to show a photograph of a soccer game to illustrate two aspects of how your social brains work. So this is a soccer game. (Laughter) Michael Owen has just missed a goal, and he's lying on the ground, and the first aspect of the social brain that this picture really nicely illustrates is how automatic and instinctive social emotional responses are, so within a split second of Michael Owen missing this goal, everyone is doing the same thing with their arms and the same thing with their face, even Michael Owen as he slides along the grass, is doing the same thing with his arms, and presumably has a similar facial expression, and the only people who don't are the guys in yellow at the back — (Laughs) — and I think they're on the wrong end of the stadium, and they're doing another social emotional response that we all instantly recognize, and that's the second aspect of the social brain that this picture really nicely illustrates, how good we are at reading other people's behavior, their actions, their gestures, their facial expressions, in terms of their underlying emotions and mental states. So you don't have to ask any of these guys. You have a pretty good idea of what they're feeling and thinking at this precise moment in time.</p>

Figure 2. Example of slide G4 and the spoken commentary

In figure 2 there are different elements that are recognisable for the audience: the social context of a sports game, the facial expressions and so forth. The concept of “the social brain” is explained to the audience by showing an example the lay audience can identify with.


Slide	Spoken commentary
 <p data-bbox="352 725 564 741">Now I know it seems really obvious,</p>	<p data-bbox="751 472 1394 898">Now I know it seems really obvious, but when you're having a conversation with someone you suspect of deception, attitude is by far the most overlooked but telling of indicators. An honest person is going to be cooperative. They're going to show they're on your side. They're going to be enthusiastic. They're going to be willing and helpful to getting you to the truth. They're going to be willing to brainstorm, name suspects, provide details. They're going to say, "Hey, maybe it was those guys in payroll that forged those checks."</p>

Figure 3. Example of slide K28 and the spoken commentary

In the second example, the slide is not verbalised; there is no explicit reference to the slide. The speaker is telling a story, and the slide shows an example, as the story of a recognisable situation is unfolded. The slide is projected to enhance the presentation and decorate the story. Both are examples of people the audience can identify with.

Furthermore, the shared visual knowledge of the peer audience stands in stark contrast to the knowledge of the lay audience. As mentioned before, speakers at TED conferences are advised not to use complicated or specified slides, and to explain any jargon. However, some shared basic knowledge and epistemic universals can be presupposed in TED's lay audience (e.g., the ability to read, knowledge of the concept of order). Interpretation of the slides, especially the graphical, requires some level of education. When using more complex visuals, speakers often guide the non-specialist audience; they tend to indicate relevant information or explain complicated technical slides (e.g., graphs, MRI scans). Consider the following example in figure 4.

Slide	Spoken commentary
	<p data-bbox="724 1890 1394 2018">So in my lab, we bring adolescents and adults into the lab to have a brain scan, we give them some kind of task that involves thinking about other people, their minds, their mental states, their</p>

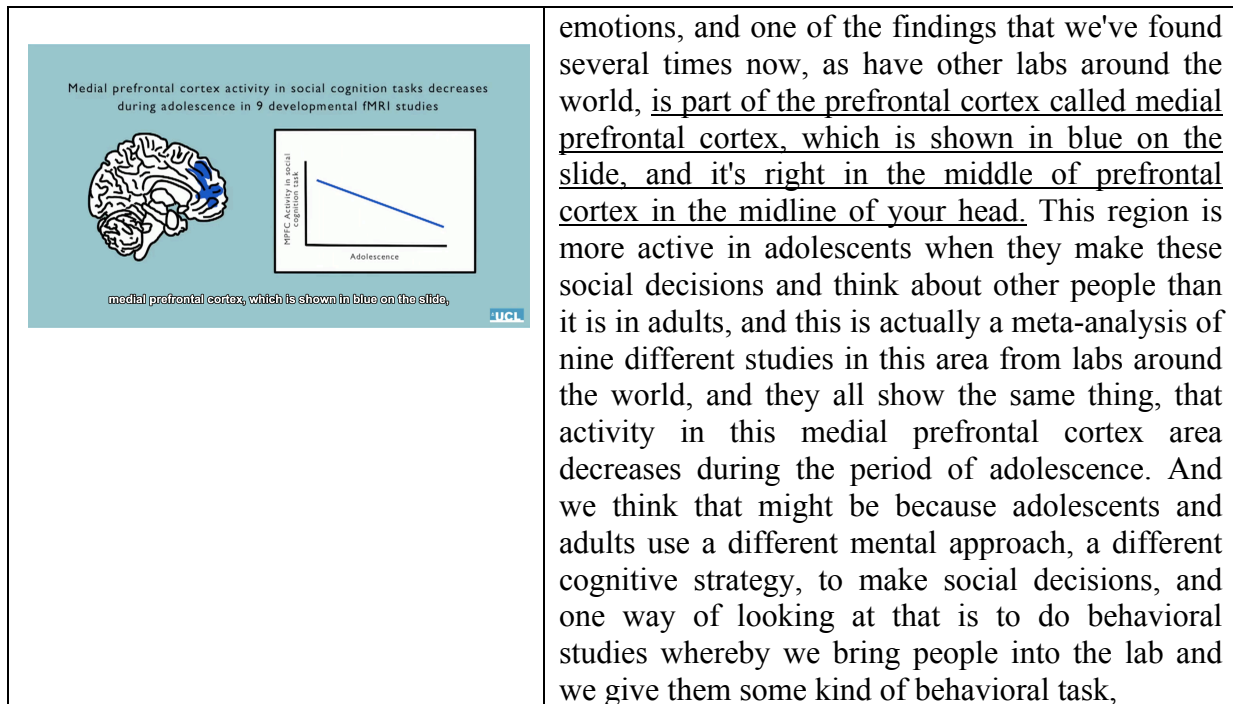


Figure 4. Example of slide G8 and the spoken commentary

In figure 4, the speaker explains to the audience where the prefrontal cortex is situated, both verbally and visually. This information would be redundant for a specialist audience.

Aside from explanation, simplification of visuals often takes place as well. We are discussing two examples of this, both found in presentation I, “The optimism bias”. Figure 5 and 6 represent simplified graphs. In figure 5, the graphical representation is used to give an example of a phenomenon called “the optimism bias”, i.e. underestimating our likelihood of bad experiences to happen and overestimating your likelihood of experiencing good experiences. This slide is situated in the introduction of the talk.


Slide	Spoken commentary
	<p>Take marriage for example. In the Western world, divorce rates are about 40 percent. That means that out of five married couples, two will end up splitting their assets. But when you ask newlyweds about their own likelihood of divorce, they estimate it at zero percent. And even divorce lawyers, who should really know better, hugely underestimate their own likelihood of divorce. So it turns out that optimists are not less likely to divorce, but they are more likely to remarry.</p>

Figure 5. Example of slide I1 and the spoken commentary

Figure 5 represents graphically the chance of newlyweds to divorce (40% chance to divorce, 60% chance to stay together). The slide is not necessary for the audience to understand the phenomenon. It is used for “decoration” and to make the presentation more attractive (e.g., use of colour).

Figure 6 shows a slide from the body of the talk.

Slide	Spoken commentary
<p>The slide displays three human silhouettes. The first silhouette is entirely yellow and labeled '50%'. The second silhouette is white with yellow legs and labeled '35%'. The third silhouette is white with blue legs and labeled '30%'. Below the silhouettes, a quote reads: "Well maybe my likelihood is about 35 percent." A small attribution 'Sherry, Korn, DeLeon, 2011' is visible at the bottom left of the slide image.</p>	<p>We asked them to estimate their likelihood of experiencing different terrible events in their lives. So, for example, what is your likelihood of suffering from cancer? And then we told them the average likelihood of someone like them to suffer these misfortunes. So cancer, for example, is about 30 percent. And then we asked them again, "How likely are you to suffer from cancer?" What we wanted to know was whether people will take the information that we gave them to change their beliefs. And indeed they did -- but mostly when the information we gave them was better than what they expected. So for example, if someone said, "My likelihood of suffering from cancer is about 50 percent," and we said, "Hey, good news. The average likelihood is only 30 percent," the next time around they would say, "Well maybe my likelihood is about 35 percent." So they learned quickly and efficiently.</p>

Figure 6. Example of slide I19 and the spoken commentary

In figure 6, the results of an experiment are graphically represented. These types of graphs are easier to interpret than a classic graph and more attractive (e.g. the use of colour and form). Nevertheless, it would probably not be sufficient to convince the peer audience.

Moreover, there are some expected sequences for CPs and short presentations in general. An example of this is an overview slide at the beginning of the presentation, in which the speaker outlines the structure of the talk. In the TED corpus, this type of slides did not appear. Rowley-Jolivet compiled an overview of the typical association between the part of the talk and the expected visuals in geology conference presentations, see table 9.

	Section	Associated Visuals
1	Introduction	Literature data to establish the context and the gap
2	Material & Method Type 1 presentation: Sample Analysis Type 2 presentation: Experimental	Identity card of the sample + Figurative visuals (photographic images of samples collected) Diagram of experimental set-up + flowchart of experimental technique
3	Results & Discussion	Graphemes (graphs)
4	Conclusion	One synthetic visual, or summary in verbal form (Scriptural)

Table 9. Typical association between section and visual type in geology. (Rowley-Jolivet, 2000: 147)

This structure in the geology presentations is strongly linked to the need for argumentation. The focus is on the method and the results, which are regularly supported by graphical visuals.

In our study, there was no typical association found between structure of the TED talks and their visuals. However, visuals are often used to support the structure as well (e.g. titles). By doing more research we might be able to discover some patterns.

Lastly, the entertainment category is important. Speakers regularly draw on personal anecdotes, photographs and humour or provoke emotions to capture the audience's attention. Waknell (2012), who is the founder of Ideas on Stage¹⁰ and has coached speakers for TEDx events (presentations skills), writes the following about TED in his blog:

People do not pay good money to go to TED to be bored. They want to be entertained, and TED audiences know that if you enjoy something, then you are more attentive; and if you are more attentive, you take more in and remember more. (Waknell, 2012)

This is an interesting observation. Entertainment, indeed, is an important part of TED Talks, even in the science category. Entertaining or humorous visuals are also used for improving the attention and retention process, as Waknell suggests. Undoubtedly, humour is present in CPs as well, and our study was not able to address humour and its differences in use in TED Talks and CPs in detail.

¹⁰ Ideas on stage is a company that provides training in public presentation (<http://www.ideasonstage.com>)

Nevertheless, humour is never the only, main aim of the talks in the science category, the dissemination of inspiring and innovative ideas remains equally important. In TED Talks in other categories, such as entertainment, the purpose might be different.

Even though many slides provoked laughter, we are looking at a few examples only. Before discussing slides with entertainment purposes, we are looking at slide E8. In this slide, the speaker included a short but noteworthy digression:

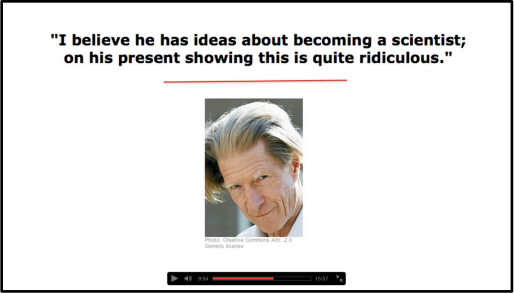

Slide	Spoken commentary
 <p>"I believe he has ideas about becoming a scientist; on his present showing this is quite ridiculous."</p> <p>John Gerdon</p>	<p>And whilst we're on the theme of hope, for those of you who might have failed at school, there's hope for you as well, because this is the school report of John Gerdon. ["I believe he has ideas about becoming a scientist; on his present showing this is quite ridiculous."] So they didn't think much of him then. But what you may not know is that he got the Nobel Prize for medicine just three months ago.</p>

Figure 7: Example of slide E8 and the spoken commentary

The information in the slide is not linked to the rest of the presentation or slide content. While the digression seems irrelevant, it does correspond to TED's main aim: inspiring people. It is difficult to determine why the speaker is using this slide. Is it to inspire the audience, to improve the audience's image of him or is there another rationale behind the use of the slide. Figure 8 shows a clear example of an entertaining slide, found in talk B.

Slides	Spoken commentary
 <p>How do you make children</p>	<p>But what's more interesting is how it tastes to you will depend critically on what you think you're eating. So one demonstration of this was done with young children. How do you make children not just be more likely to eat carrots and</p>


B17	drink milk, but to get more pleasure from eating carrots and drinking milk -- to think they taste better?
	It's simple, you tell them they're from McDonald's. They believe McDonald's food is tastier, and it leads them to experience it as tastier.
B18	

Figure 8: Example of slides B17, B18 and the spoken commentary

In B17 and 18, the visuals are projected for explaining and exemplifying a phenomenon by providing a recognisable example and drawing on the audience's knowledge. The audience is presupposed to know McDonald's. The slides also aim at provoking laughter.

In conclusion, the qualitative analysis has pinpointed some important issues and made some observations on the use of visuals in the TED corpus. Some similarities and dissimilarities between the visuals were discussed as well as some particular cases. However, more aspects of the visual channel need to be studied to complete our understanding of the use of the visual in TED Talks

5. CONCLUSION

This paper examines the visual channel of communication in TED Talks in the science category, and compares them with academic conference presentations (CP). In the second chapter, the features of CPs and TED Talks were compared using genre analysis. Some similarities in basic characteristics and contextual features were discussed (e.g., short presentations with a limited time and live audience, conference context, focus on novelty value, type of speakers).

There are also distinctions between the two communicative events. TED Talks make scientific knowledge available to a broad lay audience, a phenomenon known as science popularisation. The CP audience consists of peer researchers. The difference in audience is a crucial one and it exerts an influence on the use of visuals as well. Our second research question investigated the use of semiotic types in the slides in TED Talks compared to CPs: scriptural, mathematical and visual (graphical-figurative). We found some dissimilarities in the types of visuals used: speakers tend to use different, less technical visuals, which are understandable for the lay audience in TED.

We hypothesised that simplification would take place in the TED Talks, and this hypothesis was confirmed by the results of the study. The number of technical slides, especially graphical and mathematical was significantly lower in TED Talks than in CPs. In CPs, the argumentation behind claims is important. Proving and convincing the peer audience is key. Speakers at TED Talks use visuals differently: to explain the findings, to exemplify or to make the audience laugh (RQ 3). The visual semiotic type is drawn upon frequently in TED, and the number of photographic slides was significantly higher than in CPs (RQ 2). Furthermore, by an investigation of the periodicity of visuals, our research has shown that in both communicative events, visual semiotic resources are prominent (RQ 1).

There were some limitations to our research. The third research question resulted to be too extensive for this study to be able to formulate a clear, definitive answer. More aspects of the visual channel need to be studied. A larger, comparative and multimodal study (combining the visual and verbal semiotic resources) could help gaining more insight into TED.

Research into TED and its visuals is still in its early stages and the methodology still needs to be refined. A first logical step is to define more main characteristics and to further investigate where to situate TED in terms of genre. Only very recently researchers seem to have turned their attention to TED Talks (Sugimoto & Thelwall 2013, Sugimoto et al. 2013, di Carlo 2014a, 2014b). We know relatively little about TED, and it is important to gain a general image of the TED platform in future research. Given the fact that TED shows characteristics of popularisation, an interesting scope for future research would be to focus on popularisation and to compare TED Talks with science communication in television networks (e.g. National Geographic) or other media, such as newspapers.

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