http://dx.doi.org/10.7592/EJHR2023.11.1.760

The European Journal of Humour Research 11 (1) 46–66
www.europeanjournalofhumour.org

A multimodal analysis of humour as an engagement strategy in YouTube research dissemination videos

Edgar Bernad-Mechó
Universitat Jaume I (UJI), Spain
ebernad@uji.es

Carolina Girón-García
Universitat Jaume I (UJI), Spain
gironc@uji.es

Abstract

Science popularisation has received widespread interest in the last decade. With the rapid evolution from print to digital modes of information, science outreach has been seen to cross educational boundaries and become integrated into wider contexts such as YouTube. One of the main features of the success of research dissemination videos on YouTube is the ability to establish a meaningful connection with the audience. In this regard, humour may be used as a strategy for engagement. Most studies on humour, however, are conducted solely from a purely linguistic perspective, obviating the complex multimodal reality of communication in the digital era. Considering this background, we set out to explore how humour is used from a multimodal point of view as an engagement strategy in YouTube research dissemination. We selected three research dissemination videos from three distinct YouTube channels to fulfil this aim. After an initial viewing, 22 short humoristic fragments that were particularly engaging were selected. These fragments were further explored using Multimodal Analysis - Video (MAV)[1], a multi-layered annotation tool that allows for fine-grained multimodal analyses. Humoristic strategies and contextual features were explored, as well as two main types of modes: embodied and filmic. Results show the presence of 9 linguistic strategies to introduce humour in YouTube science dissemination videos which are always accompanied by heterogeneous combinations of embodied and filmic modes that contribute to fully achieving humoristic purposes.

Keywords: multimodality, science dissemination, engagement, humour, YouTube.

[1] Multi-layer annotation software used to describe the use of semiotic modes in video files. By using this software, researchers may analyse, for instance, how gestures, gaze, proxemics, head movements, facial expression, etc. are employed in a given file.

1. Introduction

In recent years, a new trend has emerged to digitise the dissemination of research in virtual environments far beyond the academic setting and to get the message of teacher-researchers to a wider population that are not experts in a given field of study (Rowley-Jolivet & Carter-Thomas, 2019). Accordingly, new ways to convey science have appeared not only limited to academic and cultural organisations (Scotto di Carlo, 2014), but research has also been spread among non-expert consumers. Given the unprecedented advances in Information and Communication Technologies (ICTs) in the past decades, the digitisation of information has become the main driver of knowledge transfer in any field. Therefore, it would not be strange that, in the 21st century, the new generations of information users would demand a transfer of knowledge from physical to digital modes (Girón-García & Boghiu-Balaur, 2021).

Taking this background into account, the Internet offers many possibilities for teachers and researchers to disseminate science and satisfactorily reach the general public. In this vein, researchers such as Scotto di Carlo (2015) state that "the success of knowledge dissemination depends on how experts contribute to how the audience approaches science not as something distant and separate, but as a heritage belonging to the whole community" (p. 219). In this sense, the dissemination of science through new digital genres, such as online *YouTube* videos, means a great advance, since researchers can disseminate their knowledge with greater ease, fostering involvement from the recipients of these genres. *YouTube* is seen as a source for an increasing amount of research dissemination content (Allgaier, 2020; Geipel, 2018).

In the same way that learning is currently learner-centred, research dissemination must focus on its recipients. In this sense, understanding and replicating the features of research dissemination videos as a genre that adapt to YouTube as one of its possible online distribution media is necessary for creators to produce successful and engaging materials. Broadly speaking, videos provoke user engagement, and it is important to bear in mind that ICTs have become an essential tool in responding to a new public, 'digital natives' (Prensky, 2001), who increasingly opt for personalised and online training. These digital natives need to find the reception of knowledge engaging and motivating to meet their needs and goals, and humour may play a key role in this engagement process.

1.1. Humour as an engagement strategy in science dissemination

The present study focuses on the multimodal use of humour as an engagement strategy in scientific research dissemination videos on *YouTube*. The analysis carried out in this study provides some of the keys for disseminators of science to use humour from a multimodal point of view as a tool for engagement. Humour is a complex phenomenon that is present in general communication. It is commonly referred to as the process in which amusing incongruous meanings are communicated among speakers (Banas et al., 2011). Formal definitions of humour, however, are diverse, with foci that range from discourse analysis to psychology. Scheel (2017) reviews some of these approaches and refers to "humour as a communicative process that includes incongruence and evokes a variety of emotions, either in the 'producer' of humour, in the 'receiver' of humour, or both" (p. 12). It is essential in human-to-human interactions (Fortanet-Gómez & Ruiz-Madrid, 2016) and the process to create humour is conveyed through strategies that are argued to be universal to communicate among individuals (Robert & Yan, 2007). Be that as it may, humour is also highly cultural-dependent and it is perceived differently by different speakers (Teslow, 1995). In other words, what may be humorous for a specific audience, might be inappropriate for others (Wang, 2014). Several functions have been attributed to humour, such as discourse cohesion, the creation of social influence, the ability to cope with stress and regulate emotions, bringing people together or apart, etc. (Banas et al.,

2011; Booth-Butterfield et al., 2007). Yet, one of its main functions is establishing interpersonal relations (Scheel, 2017). In this sense, Martin et al. (2003) distinguish among *affiliative humour*, used to foster liking and positive interpersonal relationships; *self-enhancing*, to cope with one's stress; *self-defeating*, used to reduce social distance and status and become closer to the audience; and *aggressive* humour, employed to magnify one's status as superior to the audience's, which is seen as a victim.

Within linguistics studies, humour has been considered from several perspectives: discourse analysis, conversational analysis, semantics, pragmatics, cognitive linguistics, etc. (Fortanet-Gómez & Ruiz-Madrid, 2016). In this line, much attention has been placed on the role of humour in academic settings (Swales, 2004; Wycoff, 1999), particularly in conference presentations (e.g. Fernández Polo, 2014; Reershemius, 2012) and in lectures (Banas et al., 2011). Wanzer et al. (2006) argue that the success of humour in lectures will depend on whether it is being used appropriately. When so, most previous studies point to a number of benefits of using humour to disseminate knowledge. Horng et al., (2005), Kher et al., (1999), and Torok et al. (2010) all argue that humour is an essential feature in a successful teacher. Specifically, humour has been shown to improve the popularity of lecturers and their evaluations (Bryant et al., 1980), create a positive classroom environment that fosters learning and relieves tensions (Wanzer et al., 2010), and even increase the credibility of the speaker (Frymier et al., 2008). An opposite view is that of Zhang (2005), who argues that humour in lectures may be seen as inappropriate by students whose culture promotes a highly formal instructional setting, such as the Chinese one. Still, humour is frequently considered a tool to engage audiences and attract attention (Wakshlag et al., 1981; Zillmann et al., 1980). This is of particular importance in online settings. In their study, Erdoğdu and Çakıroğlu (2021) explore the impact of humour on 74 students during a 14-week online university course. They found out that "humorous elements created a significant difference and improved behavioural engagement for course materials, discussions, and assignments" and "the use of humour created a significant difference and improved emotional engagement" (p. 1). In short, Cornett (1986, p. 8) refers to humour as a teacher's "most powerful resource".

Humour has been widely researched in the fields of communication and as a persuasive strategy (Boukes et al., 2022; Boukes & Hameleers, 2022; Boykoff, 2019; Boykoff & Osnes, 2019; Martin, 2006; Skurka et al., 2018). In research dissemination settings, i.e., the field of study of the present paper, Carter-Thomas and Rowley-Jolivet (2020) identify humour as one of the strategies employed in Three Minute Theses presentations to establish a relationship with the audience that becomes stimulating and appealing. The trend to employ humour as an engagement technique has also been found in the online realm and online social networks. As a matter of fact, humour becomes an essential trait of advertising and persuasiveness in the use of images on *Twitter* (Duque, 2021), on *WhatsApp* (Cruz-Moya & Sánchez-Moya, 2021), or transmedial (Tuksar & Labaš, 2021). It is important to remark that the present study focuses on a very specific genre, i.e. *YouTube* science dissemination videos, which are highly scripted, and little room for improvisation is available in terms of content. Thus, although communicators are closely looked at in our dataset, they are seen as mere actors and actresses and our main interest lies in the description of the humoristic instances from a multimodal point of view.

Regarding the medium where these videos are integrated, *YouTube* is one of the main online platforms to enhance visibility of science, as well as to expand the academic research impact because of its rapid distribution and the presence of informal exchanges (Osterrieder, 2013). Science dissemination on *YouTube* has been explored by many researchers (Muñoz Morcillo et al., 2016; Welbourne & Grant, 2016) who argue that technical aspects such as *montage*, cinematography, type of shots, narrative strategies, etc. play an important role in the success of these videos. In addition, Frobenius (2014) and Pérez-Torres et al. (2018) focus on the description of a successful YouTuber profile and reflect on the importance of interacting with

the audience as equals. In this line, González García et al. (2020) identify young male communicators using a wide range of visual animations as the most effective content creators. Indeed, audiences need to be considered to create successful research dissemination videos, particularly as public communication of science is not targeted to experts in the field, but to a wider, more general public. In these cases, a process of recontextualization of academic contents (Luzón, 2019) is necessary and, therein humour may be used as a strategy to bring complex content to a non-specialised audience. Still, more research is needed to fully comprehend the role of humour in online science dissemination contexts as new digital genres. Paek et al. (2010), for instance, found out that humour may be excessive and have negative consequences when viewing antismoking video campaigns on *YouTube*. In this regard, Dynel and Chovanec (2021) claim that there is a need to explore how technology in new media has an impact on how humour is used as an interactive device. They argue that a further understanding of the affordances of digital media is necessary to shed some more light on the pragmatics of humour in the technological era.

1.2. Multimodality and humour for science dissemination

As reviewed above, research on humour and science dissemination has been extensive in the last decades within the realm of discourse studies. Nevertheless, most of these analyses depart from a purely linguistic perspective, i.e., they focus only on what speakers say: the verbal propositional content of interactions. Against this backdrop, our study takes on the premise that all communication is inherently multimodal (Kress, 2010). By looking at interaction from this point of view we assume that meaning is not conveyed through one mode only (e.g., the verbal mode); instead, it is only through the combination of several modes in *multimodal ensembles* that full meaning is conveyed. Thus, multimodal analyses focus not only on *what* is said but also on *how* it is said, considering other modes of communication like gestures, gaze, posture, use of visuals, music, etc. As a result, a more complete image of human interaction and how communication occurs may be achieved.

Three main theoretical paradigms have traditionally been put forward to conduct multimodal analyses in academic genres (Bernad-Mechó, 2021): Multimodal Social Semiotics (MSS) (Kress & van Leeuwen, 1996), Multimodal Discourse Analysis (MDA) (O'Halloran, 2004), and Multimodal (Inter)action Analysis (MIA) (Norris, 2004). These approaches mainly differ in their foci of analysis and the methodological tools employed. For this paper, an MDA will be followed. An MDA analysis provides the researcher with the tools to identify which semiotic resources play a role in communication, how they interact with each other, and to what extent they are relevant. In the present study, such analysis will offer an overview of how humour occurs, looking at all the elements that are necessary for its creation. Thus, in MDA the focal point is on the exploration of the use of semiotic resources and the combinations among them to convey meaning. Most MDA studies presuppose language as the main mode to which other modes may be attached (Crawford-Camiciottoli & Fortanet-Gómez, 2015). Although this is not necessarily true (there might be instances in which other modes become more relevant), it is indeed a practical way to conduct analyses in research dissemination videos in which content is mainly transmitted through the verbal mode.

To conduct an MDA, it is necessary to define the concept of *mode*. Modes are seen as recurrent semiotic systems following rules in their use (Kress & van Leeuwen, 2001). Thus, any system that is able to convey some meaning in a given interaction may be considered a mode. In the case of *YouTube* videos, two main types of modes have been identified: embodied and filmic modes (Valeiras-Jurado & Bernad-Mechó, 2022). Although the definition of *embodiment* and what makes a mode embodied or not is not a clear-cut one –see Norris (2004)-, for analytical purposes we will assume that embodied modes are those that are performed using the body

(language, gestures, gaze, facial expression, etc.). Filmic modes, on the other hand, encompass those modes that convey meaning through the production and post-production processes of video clips, such as types of shots, music, use of digital visuals, sound effects, etc. All these modes, in turn, interact with each other creating *multimodal ensembles*. The study of these combinations of modes is central to MDA and can reveal the complexities in the interaction.

Although previous studies of multimodality in academic settings are abundant, only a few authors explore the multimodal nature of humour. In fact, Dynel and Chovanec (2021: 151) argue that there is a:

> "need for multimodal analysis of media humour, which ranges from memes to broadcasts and films, as well as to the processes of decontextualisation and recontextualisation, which are germane to the production and reception of humour in various traditional and new media contexts".

This is especially important in the case of humour, as it has been shown that nonverbal elements such as the use of gestures or facial expressions may indeed be triggers for humoristic exchanges (Wanzer et al., 2005). The multimodal attributes of humour in academic genres have been analysed in conference presentations. Fortanet-Gómez and Ruiz-Madrid (2016), for instance, explore the use of humour in plenary lectures in English and Spanish. Although no significant differences are found across languages, these authors argue that humour is used intentionally as a strategy to draw and maintain attention, entertain, and create a de-stressed environment. They also describe humour as co-occurring with gestures, pauses, and specific intonation patterns to trigger laughter in the audience. The use of non-verbal modes as humoristic triggers is also identified by Tabacaru and Lemmens (2014). These authors explored the use of humour in American television series and found out that raised eyebrows co-occur with sarcastic instances and function as elements that connect what is said with non-explicit assumptions, thus guiding the audience to interpret these instances as humorous.

In digital genres, multimodal humour has been analysed in the creation of memes (Vásquez & Aslan, 2021) and online-mediate conversations (Attardo et al., 2013); however, to the best of our knowledge, no previous study has explored multimodal humour in science dissemination videos. Thus, the main aim of this paper is to analyse *YouTube* science dissemination videos with a particular focus on the multimodal use of humour as an engagement strategy. To guide our study, the following research questions have been addressed:

(RQ1): What humoristic strategies can be found in *YouTube* research dissemination videos in the creation of humour?

(RQ2): How is humour conveyed from a multimodal perspective as an engagement strategy?

2. Methodology

In order to answer the above-mentioned research questions, we have selected three videos from *YouTube* that disseminate science in three different fields (e.g., medicine, linguistics, and astrophysics). These videos were selected as part of a wider corpus to study how engagement occurs from a multimodal point of view (Bernad-Mechó & Valeiras-Jurado, 2023). In particular, these videos were identified as particularly engaging by an audience of higher education students within science dissemination videos produced by the company PBS (Public Broadcasting System). The first video is entitled "7 Medicines That Come from Super Toxic Critters[2]" and was uploaded to *SciShow*, a *YouTube* channel with over 7 million subscribers. It

[2] https://www.youtube.com/watch?v=CRBy_netFfg

features Hank Green, a well-known American Internet celebrity and developer of educational content. The video lasted 12 minutes and 58 seconds, and at the time this paper was written, it had 773.754 views and 16.439 likes. The video introduces seven examples of toxins that have been transformed into medicines. The second video, "The Unexpected Origins of the Word 'Monster'[3]" features Dr. Erika Brozovsky, a sociolinguist from the Department of English at The University of Texas at Austin and the host of a *YouTube* channel called *Otherwords!* With 584.000 subscribers. The video lasted 8 minutes and 17 seconds and it had 178.550 views and 14.765 likes. It deals with the etymological origin of the word "monster". The third video is on astrophysics, and it belongs to one of the episodes of the channel *PBS Space Time*, with 2,58 million subscribers, entitled "Why Haven't We Found Alien Life? [4]". It explores the reasons why alien life has never been spotted. This video was 12 minutes and 10 seconds long and, at the time this research was conducted, it had 3.015.028 views and 35.794 likes. Although humour is highly subjective, we argue that the videos described provide several humorous instances. This, however, is only one view on the dataset and further research is needed to explore the uptake of a wider audience. Be that as it may, the main objective of this paper is to expand on previous analyses of humour by providing a methodology that is able to further explore how humour is created.

Once the videos were selected, a first individual viewing was carried out by each of the researchers to identify "rich points" (Valeiras-Jurado, 2015); in this case, those moments that were more engaging or humorous for each of the researchers. After sharing the results with each other, the annotations and observations were compared, and 22 coinciding humoristic instances were identified by both researchers and were thus selected for further analysis. Those instances on which there was no agreement to their humoristic tone were discarded. The selected fragments were then explored to discern how humour is created in *YouTube* research dissemination videos. Following a corpus-driven approach, the excerpts were explored to identify humour-creating strategies that were present in the data for the creation of humour. This analysis provided us with preliminary results related to the linguistic and contextual features of each of the chosen fragments. For the next step, the 22 selected fragments were multimodally annotated using the software Multimodal Analysis Video (MAV) (O'Halloran et al., 2012) and following an adaptation of Valeiras-Jurado and Bernad-Mechó's (2022) framework for the multimodal analysis of research dissemination videos (see Table 1 below). As described in the introduction, these authors establish two main layers of analysis: *embodied modes* and *filmic modes*. *Embodied modes* refer to all verbal and non-verbal strategies in which presenters use their body. In this analysis, we will focus on spoken language, paralanguage, gestures, gaze, head movements, and facial expressions. As regards *filmic modes*, they allow the exploration in greater depth of visuals, sound, and other elements that can be found in videos of this nature. In particular, the filmic modes analysed are the following: type of shot, cuts, music, visual prompts (i.e., image and text), sound effects, and visual effects. The qualitative analysis of multimodal *ensembles* disclosed the intricacy of the interaction between embodied and filmic modes in the creation of humour.

[3] https://www.youtube.com/watch?v=swuoSZXQTac&t=205s

[4] https://www.youtube.com/watch?v=cJONS7sqi0o&t=1s

Table 1. Multimodal framework for the analysis of YouTube research dissemination videos (adaptation from Valeiras-Jurado and Bernad-Mechó, 2022)

EMBODIED MODES	spoken language	
	paralanguage	Prominence
		Pauses
		Tempo
	gestures	Iconic
		metaphoric
		Deictic
		Beats
	Gaze	
	head movements	nod
		shake
		tilt
	facial expressions	eyebrow raising
		frown
		smile
FILMIC MODES	type of shot	close-up
		medium close-up
		medium shot
		cowboy shot
		medium-full shot
	Cuts	
	music	
	visual prompts	image
		text
	sound effects	
	visual effects	

3. Results and discussion

3.1. Humour-creating strategies in *YouTube* research dissemination videos

In order to address our first research question, the dataset was explored to identify humour-creating strategies that seem to be present in humoristic fragments. 9 main features were found out to be present to a higher or lower extent in the dataset:

1) *Humour in recontextualizations and reformulations*: One of the common ways in which humour is introduced in research dissemination videos is through the processes of reformulation and recontextualization of content. In these instances, speakers explain scientific concepts in two ways: first, in academic –or more formal- terms, and then, in a more informal manner. By adapting the content for a wider, non-specialized audience, speakers may create a humoristic effect (see example 1). In line with Gotti (2014), the use of humour and sarcasm in reformulations contributes to performing a popularising function.

> (1) […] venoms and poisons are chock-full of molecules evolved to do highly specific things in small amounts. In other words, they're ideal pharmaceuticals. (MED_1 00:49 - 00:58)

2) *Register shifting*: This feature is closely related to most instances of humour in science dissemination. In fact, all reformulations and recontextualizations entail a shift in formality from academic language to informal speech, and this is also a common verbal trait whenever humour occurs. However, not all register shifts are reformulations or recontextualizations. For example, register shifting may occur as part of a more formal explanation (see example 2). In this example, the speaker is referring to a specific drug to treat constipation, and he alternates academic concepts ("binding to and activating receptors", "softens your stool") with informal ones ("open the floodgates", "a bunch", "easier to poo").

> (2) These drugs work by binding to and activating receptors on the cells that line your gut, telling them to open the floodgates and release a bunch of water and salt. That, in turn, softens your stool, making it… easier to poo. (MED_3 06:30 - 06:44)

The use of informal language in what may seem an inappropriate context (e.g. in a scientific genre) can lead to humoristic effects (Gardner, 2010). Register shifts with a humoristic intention, however, might also create an adverse effect in the audience, as identified by Rogerson-Revell (2007) in the use of humour in intercultural business meetings. Finally, register shifts might also occur visually through "visual register shifts". They entail a shift in register which is not conducted verbally, i.e. by the speaker, but it is done through the use of informal imagery and other visual elements. This feature is many times found to accompany formal stretches of speech. In Figure 1, for instance, the speaker is providing a formal explanation to justify how the case of Earth may be taken as a starting point to discuss the possibility of alien life. This explanation is then accompanied by a meme (also a pop culture reference to *The Matrix*). Although the verbal explanation *per se* remains formal, the use of visual humoristic devices seems to contribute to the engagement of the audience.

Figure 1. Example of Visual Register Shifting: "Of course we're going to observe at least one instance of intelligent life happening because we are that one instance. (AST_5 01:48 – 01:53)"

3) *Irony*: Irony has been broadly researched as a humoristic device (Dynel, 2014). In research dissemination, it is often employed interspersed with more serious strands of information (see example 3).

> (3) But scientists are concerned that in many cases we might not find game-changing drugs or cool surgical aids because we've driven the creatures that produce them… to extinction. (MED_4 12:17 - 12:27)

The identification of ironic elements in these videos, however, cannot only be carried out by a mere examination of the transcripts. As Attardo et al. (2003) argue, pitch contrasts and visual facial cues are essential to discern ironic and sarcastic instances in speech.

4) *Exaggerations*: Like irony, exaggeration has been traditionally included within typologies of humour (Tsakona, 2009). As a humoristic device, it has been found in the dataset in cases like example 4, in which the speaker presents a list of plausible apocalyptic scenarios as well as a rather unlikely exaggerated one.

> (4) This genuine oddity is referred to as the Fermi paradox and the resolution for it has to be that there's some sort of Great Filter that either makes intelligent life extremely rare in the first place, or that wipes out essentially all advanced civilizations before they get to the galactic empire stage, whether by nuclear war, environmental catastrophe… accidentally making a black hole that swallows the planet, et cetera. (AST_3 00:46 – 01:08)

5) *Pop culture references*: As argued in the introduction, the ability of research disseminators to engage their audience will be a key aspect to determine the success of *YouTube* videos. In the data set, references to pop culture are used humorously towards that aim. In fact, these references target a very specific group of viewers who might share interests, age, etc. In examples 5 and 6, for instance, the speaker is using references to the *Star Wars* movies and the series *Doctor Who* to create humour.

(5) […] probably billions of them are Earth-sized planets around sun-like stars. Many of them have been around long enough to produce a civilization that could have easily colonised the entire galaxy by now. So why is the Milky Way so unstarwarsy? (AST_2 00:33 - 00:46)

(6) So, let's dig into whether we should really expect to see a Silurian Empire. (AST_1 00:26 – 02:30)

Both examples refer to sci-fi/fantasy cinema productions from the 1970s and 1980s, which have been revisited in the last decades. All in all, these references are targeted to an audience who is interested in this genre and who might have watched the original Star Wars and Doctor Who series or the new ones.

6) *Language puns*: Although not that frequent, they have also been found in the dataset. In example 7, the speaker is using the expression "How on Earth did this happen?" to express surprise and suggest the improbability of something happening. However, in the specific case, he is also using the expression in its literal meaning: he wants to introduce the question as to how Earth became populated with life so quickly.

(7) But either way, it looks like Earth became a slimeball teeming with life in a crazy short amount of time. How on Earth did this happen? (AST_7 05:51 – 05:58)

7) *Reflexive humour*: Many times, humour may be created reflexively by targeting either an individual or a collective self (Zekavat, 2020) or through self-deprecation (Tang & Sun, 2021), i.e. through the use of sarcastic and/or negative comments towards the speakers themselves. In our dataset, we have found humoristic instances in which a degree of reflexive humour is present, albeit not in a self-deprecating way. In example 8, the speaker enumerates a list of complex life forms within which he includes humans (a collective self). To refer to humans, however, he describes "a species capable of making the Kerbal Space Program" (a space flight simulation videogame). This becomes a way of acknowledging himself and the audience within the discourse and he seems to ironically portray the development of a videogame as one of the main achievements of humanity.

(8) No, multicellular life evolved independently dozens of times. It just took a really long time for those single cells to become complex enough to form large collaborative structures capable of collective reproduction, i.e. plants, animals… a species capable of making the Kerbal Space Program,… (AST_8 08:30 – 08:46)

8) *Taboos*: Humour is many times attached to taboos to make it easier for speakers to refer to controversial topics (Caulfield et al., 2021). In our data, several humoristic referrals to taboo topics can be found. In example 9, the speaker is talking about the inability to "poop", but instead of referring to it directly, he employs the euphemism "things get a little clogged up", a more humoristic expression, to ease the ways in which the issue is referred to.

(9) If you're wondering why on Earth scientists would want to replicate that experience… well sometimes people have the opposite problem… things get a little clogged up. (MED_2 06:12 – 06:21)

9) *Humour as comic relief*: Lastly, one of the main contexts in which humour is found in the dataset is as a comic relief. In other words, humour is many times employed to interrupt longer academic explanations that might be tedious for the audience. By doing so, speakers might attempt to maintain the attention of the audience. Example 10 below showcases this. In this fragment, the speaker is introducing a theory to the audience. This is then interrupted by the

humorous pun "but before we get all emo, let's science this right" (a pop culture reference), which serves as a comic relief before moving on to another bit of theory.

> (10) Well, there's another deeply sad and deeply inspiring possibility: Humanity may be one of the very first interstellar species in the history of the galaxy. [PAUSE] But before we get all emo, let's science this right. We know of exactly one instance of intelligent life happening: The case of Earth […] (AST_4 01:24 – 01:40)

All these traits describe the ways in which humour is being used across our dataset. However, they mostly describe humour from the point of view of the verbal mode. In fact, when only looking at words, it is not always possible to discern between what is humoristic and what is not. Consequently, multimodal contexts are needed to fully understand humor. It is precisely the combination of multiple semiotic resources in complex multimodal ensembles that contributes to the creation of successful humoristic performances. The multimodal nature of humour in research dissemination videos is further explored in our second research question.

3.2. Embodied and filmic modes to create humour

Our second research question delves into the multimodal nature of humour in research dissemination videos. Specifically, it aims to explore how humour is conveyed both, verbally, and non-verbally, to become an engagement strategy. To tackle this question, the 22 humoristic instances selected for further analysis were multimodally annotated using the software MAV. The main feature derived from the analysis is that humour is indeed created by employing two sets of modes distinguishably: embodied and filmic.

From the point of view of embodied modes, our results describe how humour harnesses embodied non-verbal modes in the conveyance of meaningin line with previous studies (Attardo et al., 2013; Fortanet-Gómez & Ruiz-Madrid, 2016). In example 11, for instance, the speaker enumerates six key stages in the evolution of life that led to the development of intelligent technological life, from the self-replication of organic RNA in the early stages of the Earth to the appearance of *homo sapiens*. Instead of referring to this last stage simply as "humans", the speaker uses "the first intelligent lifeform capable of counting to six on *YouTube*", thus creating a humoristic fragment in the form of reflexive humour (collective self): out of the endless impressive examples that could illustrate humans' intelligence and use of technology, he chose a rather plain one (the ability to count on an online platform).

(11)

03:18	And SIX (PAUSE),
03:19	the first intelligent lifeform, capable of counting to six (PAUSE),
03:22	on YouTube.

(ASTRO_6 03:18 – 03:23)

This instance, however, reaches its full humoristic potential by accompanying the verbal joke with a series of non-verbal embodied modes. First, the speaker uses paralanguage to control the rhythm of his explanation. In particular, he emphasises the word "six" prominently as part of his enumeration. This emphasis is also followed by a short pause before the introduction of the humoristic fragment. Furthermore, the speaker performs a falling intonation in three clearly distinguishable steps: "the first intelligent lifeform"; "capable of counting to six"; and "on YouTube". The use of pauses and intonation has been proven to be used as anticipators of humour (Fortanet-Gómez & Ruiz-Madrid, 2016; Kyratzis, 2003). Furthermore, several visual embodied modes are necessary to fully provide a comic sense to the utterance. In particular, the speaker makes use of gestures, gaze, head movement, and facial expression. Images 1 and 2 in Table 2 show the beginning of this fragment. The speaker uses a metaphoric gesture to indicate

the abstract concept of "six" (Image 1), and then a beat that is consistent with the normal disclosure of content (Image 2). This part is accompanied by a gaze towards the camera and neutral use of facial expressions. Images 3 and 4, on the other hand, contain the humoristic part. In this case, the speaker changes his non-verbal attitude towards the audience by gazing to his left, tilting his head and raising his eyebrows (Image 3) purposely decreasing credibility; and finally, by using a deictic gesture (extending hands and arms towards the camera) to refer to *YouTube* as the platform that he is sharing with the audience and frowning (Image 4). The specific use of these combinations of modes reinforces the shift in the degree of seriousness of the speaker (Image 3) to introduce a meta reference (Image 4), thus contributing to getting the message across to the audience.

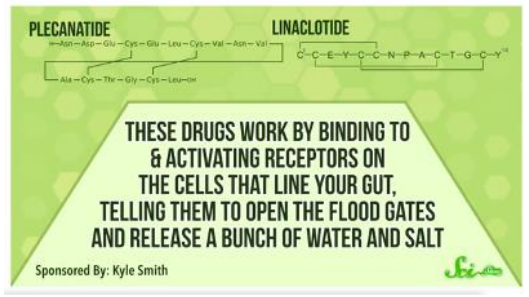
Table 2. Use of embodied modes to create humour

1		"And six,"
2		"the first intelligent lifeform (PAUSE)"
3		"capable of counting to six (PAUSE)"
4		"on YouTube."

Furthermore, filmic modes are also integrated in humoristic multimodal ensembles. As argued above, and as demonstrated in previous literature (Valeiras-Jurado & Bernad-Mechó, 2022), the inclusion of filmic/editing modes to the analysis of digital genres offers a wider perspective on how communication occurs across the screen. In our analysis, filmic modes have proven to become essential to the orchestration of humoristic multimodal ensembles. In fact, and in agreement with Welbourne and Grant (2016), they are key to engaging the audience in research dissemination *YouTube* videos. The role of filmic modes can be seen as a complement to verbal humoristic fragments, or it can become humoristic *per se*.

Table 3, for instance, shows a case of the former. In this fragment, the speaker is talking about "enterotoxins", an organism responsible for food poisoning which is used in medicine to fight chronic constipation. In his speech, the speaker combines fragments with different degrees of formality, including marked register shifts to taboo language appealing directly to the audience. As in the previous example, humour is also flagged by a combination of embodied modes (gestures, use of pauses, head movement, and facial expression). When considering editing choices, closer shots of the speaker are preferred to highlight these modes in humoristic fragments. In the example below, a medium-close-up shot is used in Image 1, as the presenter introduces the concept of "enterotoxins", and, on the other hand, a close-up is preferred for the humoristic utterance in Image 2. This choice draws the speaker nearer to the audience, portraying what could be seen as a playful smile, an eyebrow raising, and a head tilting which contribute to making this taboo utterance humorous. Then, as he continues with a more formal explanation, a medium shot is preferred (Image 3). Furthermore, the inclusion of this humoristic fragment is marked by two cuts that clearly separate this utterance from the rest of the speech, thus creating a more frenzied rhythm that is capable of engaging the audience, increasing audience attention and persuasiveness (Chambers, 2001; Miller et al., 1976; Smith & Shaffer, 1995; Welbourne & Grant, 2016). Next, a fully academic explanation is provided, and it is backed up by a slide, possibly to facilitate comprehension (Image 4), only to go back to a medium-close-up shot of the speaker as he reformulates the lengthy explanation in more vulgar terms (Image 5). In this regard, the specific choice of a close shot of the speaker over a slide for the humoristic instance contributes to creating comicality as viewers access the full range of modes in a multimodal ensemble in which all embodied modes work coherently towards the such aim. In fact, this multimodal coherence has been identified as a feature of online science dissemination videos (Valeiras-Jurado & Bernad-Mechó, 2022).

Table 3. Use of filmic modes to complement embodied humour

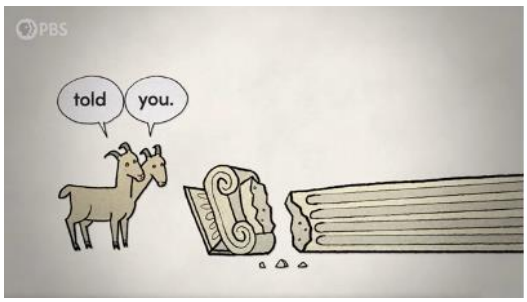
1		"I'm talking about enterotoxins, also known as those nasty things from e coli bacteria that cause food poisoning."
2		"That time you had a bad burrito and spent the night with diarrhoea, that (PAUSE) was probably (PAUSE) an enterotoxin…"
3		"If you're wondering why on earth scientists would want to replicate that experience […]"
4		"So there are actually two enterotoxins ESC proteins on the market for people with chronic constipation and constipation related to irritable bowel syndrome. These drugs work by binding to and activating receptors […]"
5		"That, in turn, softens your stool making it … (PAUSE) easier… (PAUSE) to poo."

On the other hand, the use of filmic modes can also be humoristic on its own, detached from most embodied modes. Table 4, for example, shows a fragment of the video on linguistics. In this excerpt, the speaker is discussing the origin of the word "monster" as coming from the Latin form *monstrum* (evil omen). In this case, the presenter is offering a formal explanation on

superstition and people's beliefs (Image 1). In fact, at this point, two systemic drawings are used as visual prompts to refer to "genetics" and "prenatal development". Image 2 and 3, however, describe a visual and auditory contrast in terms of register. Even though the verbal explanation provided by the speaker remains rather formal, visual prompts, sound and visual effects, and music take a more cartoon-like touch to orchestrate the comicality of the fragment. On the one hand, cartoons are used to depict a farmer who suffers an accident as anticipated by a two-headed goat. Furthermore, the animation is accompanied by a series of sound effects that provide a comic effect: the goat bleating unceasingly, the column crushing the farmer, and the cane flying away. Then, the text is also used as a visual prompt to create humour in the bubbles above the goat saying, "told you" (Image 4). Finally, the music in this fragment hints at an amusing medieval tune that ends in a sad tone after the farmer is crushed by the column. Actually, music plays a relevant role in delimiting the length of the humoristic fragment: right after this instance, music (and the rest of the visual prompts and effects) becomes more serious as the speaker progresses her explanation (Image 5). This would entail a case of visual register shifting, in which filmic modes are used to create a comical piece that would otherwise be rather formal. In fact, the only embodied mode playing a part in the creation of humour is paralanguage through the pause right before the farmer is crushed by the column (Image 3) also contributing to the coherence of the ensemble.

Table 4. Use of filmic modes as humoristic *per se*

1		"It may seem silly today, but you can kind of see how, long before anyone understood genetic mutation or prenatal development,"
2		"having a two-headed goat pop up on your farm, might make you feel like someone was trying to tell you something."
3		"And that something (PAUSE), probably wasn't good."

4		
5		"MONSTRUM was derived from the Latin word MONERE, which meant to warn, remind or instruct […]"

4. Conclusion

In this study we have examined the multimodal use of humour as an engagement strategy in scientific research dissemination videos on *YouTube*. To provide answers to the research questions posed, we have analysed the use of embodied and filmic modes present in three videos of different nature (medicine, linguistics, and astrophysics) using the software MAV and following Valeiras-Jurado and Bernad-Mechó's (2022) framework for the analysis of research dissemination videos. From our multimodal analysis, we have found out that the two different layers of modes (i.e., *embodied* and *filmic*) are employed coherently for the successful creation of humoristic fragments. Therefore, our analysis provides insights into the different linguistic strategies that create humour in this type of dissemination videos, as well as how a multimodal analysis helps in understanding in what way humour is created as an engagement strategy.

The results derived from our multimodal analysis suggest that humoristic strategies such as the use of informal language instead of formal registers contributes to conveying humour in *YouTube* research dissemination videos. Besides, the identification of ironic elements in oral communication and the presence of exaggerations, among other strategies, are clearly representative of humour as an engagement strategy.

Integrating embodied modes in the selected videos provides humorous instances, and therefore, these actively engage the audience of such *YouTube* videos. And as for the *filmic modes* analysed, these are complemented by the embodied modes examined, thus increasing the potential engagement of the speakers. Additionally, it is important to remember that visual register shifting has turned out to be a key element in analysing *filmic modes* since these register shifts with informal images and other visual elements positively contribute to the creation of humour.

To conclude, being involved in a digital context presupposes a new user who is digitally competent. This implies that new generations of users must have already been previously trained in the management of basic computer tools, either formally or as self-trainees. Therefore, disseminators are faced with a new viewer profile: *digital natives* (Prensky, 2001). In this regard, further research is needed to discern how content creators exploit the affordances of new digital genres to communicate science. In relation to humour, a deeper focus on the targeted audience is necessary to assess its effectiveness and account, among others, for unintended and failed

humour (Bell, 2015). Such a study would complement our multimodal analysis, describing whether the multimodal choices made by the producers are perceived as humoristic. Although the results derived from this study cannot be generalised, as in most multimodal analyses, we believe further exploring these types of videos would help researchers understand and redefine online genres and environments in which *YouTube* videos disseminating science are embedded.

Acknowledgements

This study is encompassed within a research project funded by the Ministerio de Ciencia, Innovación y Universidades, Spain (Ref: PGC2018-094823-B-I00) and entitled *Análisis de los géneros académicos en la docencia en inglés de grados internacionales desde una perspectiva multimodal y multicanal* and within a research project funded by Universitat Jaume I (UJI), Spain (Ref: UJI-B2020-09) entitled *Descripción y análisis multimodal de los repertorios genéricos docentes en contextos académicos de docencia en inglés en las disciplinas de económicas, ingeniería y ciencias de la salud*.

References

Allgaier, J. (2020). 'Science and medicine on YouTube', in Husinger, J., Allen, M.M & Klastrup, L. (eds.), *Second International Handbook of Internet Research*. Dordrecht: Springer, pp. 7–27.

Attardo, S., Eisterhold, J., Hay, J. & Poggi, I. (2003). 'Multimodal markers of irony and sarcasm'. *Humor: International Journal of Humor Research* 16 (2), pp. 243–260.

Attardo, S., Pickering, L., Lomotey, F., & Menjo, S. (2013). 'Multimodality in conversational humor'. *Review of Cognitive Linguistics* 11 (2), pp. 402–416. https://doi.org/10.1075/rcl.11.2.12att

Banas, J. A., Dunbar, N., Rodriguez, D., & Liu, S.-J. (2011). 'A review of humor in educational settings: four decades of research'. *Communication Education* 60 (1), pp. 115–144. https://doi.org/10.1080/ 03634523.2010.496867

Bell, N. (2015). *We Are Not Amused. Failed Humor in Interaction*. Berlin, New York: De Gruyter. https://doi.org/10.1515/9781501501586

Bernad-Mechó, E. (2021). 'Combining multimodal techniques to approach the study of academic lectures: a methodological reflection'. *Atlantis. Journal of the Spanish Association of Anglo-American Studies* 43 (1), pp. 178–198. https://doi.org/10.28914/Atlantis-2021-43.1.10

Bernad-Mechó, E. & Valeiras-Jurado, J. (2023). 'Multimodal engagement strategies in science dissemination: a case study of TED talks and YouTube science videos'. *Discourse Studies* 25 (6), pp. 1-22. https://doi.org/10.1177/14614456231161755

Booth-Butterfield, M., Booth-Butterfield, S., & Wanzer, M. B. (2007). 'Funny students cope better: patterns of humor enactment and coping effectiveness'. *Communication Quarterly*, 55, pp. 299–315.

Boukes, M., Chu, X., Noon, M. F. A., Liu, R., Araujo, T. & Kroon, A. C. (2022). 'Comparing user-content interactivity and audience diversity across news and satire: differences in online engagement between satire, regular news and partisan news'. *Journal of Information Technology & Politics* 19 (1), pp. 98–117. https://doi.org/10.1080/19331681.2021.1927928

Boukes, M. & Hameleers, M. (2022). 'Fighting lies with facts or humor: comparing the effectiveness of satirical and regular fact-checks in response to misinformation and

disinformation'. *Communication Monographs* 90 (1), pp. 1–23. https://doi.org/10.1080/03637751.2022.2097284

Boykoff, M. (2019). *Creative (Climate) Communications*. Cambridge: Cambridge University Press. https://doi.org/10.1017/9781108164047

Boykoff, M., & Osnes, B. (2019). 'A laughing matter? Confronting climate change through humor'. *Political Geography* 68, pp. 154–163. https://doi.org/10.1016/j.polgeo.2018.09.006

Bryant, J., Comisky, P. W., Crane, J. S. & Zillmann, D. (1980). 'Relationship between college teachers' use of humor in the classroom and students' evaluation of their teachers'. *Journal of Educational Psychology* 72, pp. 511–519.

Carter-Thomas, S. & Rowley-Jolivet, E. (2020). 'Three minute thesis presentations: recontextualisation strategies in doctoral research'. *Journal of English for Academic Purposes* 48, pp. 1–14.

Caulfield, J., Day, M. & Phillips, B. J. (2021). 'Death in advertising: the last taboo?' *The Review of Marketing Communications 40* (7), pp. 1073–1095. https://doi.org/10.1080/02650487.2020.1830687

Chambers, H. E. (2001). *Effective Communication Skills for Scientific and Technical Professionals*. Cambridge, Mass: Perseus Publishing.

Cornett, C. E. (1986). *Learning Through Laughter: Humor in the Classroom*. Bloomington, Indiana: Phi Delta Kappa Educational Foundation.

Crawford-Camiciottoli, B. & Fortanet-Gómez, I. (2015). *Multimodal Analysis in Academic Settings: From Research to Teaching*. New York and London: Routledge.

Cruz-Moya, O. & Sánchez-Moya, A. (2021). 'Humour in multimodal times. Insights from online interactions among senior users of a WhatsApp group'. *Internet Pragmatics 4* (1), pp. 52–86. https://doi.org/10.1075/ip.00061.cru

Desilla, L. (2012). 'Implicatures in film: construal and functions in Bridget Jones romantic comedies'. *Journal of Pragmatics* 44, pp. 30–53.

Duque, E. (2021). 'Oralidad e imagen en el discurso publicitario de las redes sociales'. *Revista Oralia* 24 (2), pp. 237–261.

Dynel, M. (2014). 'Isn't it ironic? Defining the scope of humorous irony'. *Humor: International Journal of Humor Research* 27 (4), pp. 619–639. https://doi.org/10.1515/humor-2014-0096

Dynel, M. & Chovanec, J. (2021). 'Creating and sharing public humour across traditional and new media'. *Journal of Pragmatics* 177, pp. 151–156. https://doi.org/10.1016/j.pragma.2021.02.020

Erdoğdu, F. & Çakıroğlu, Ü. (2021). 'The educational power of humor on student engagement in online learning environment'. *Research and Practice in Technology Enhanced Learning* 16 (9), pp. 1–25. https://doi.org/10.1186/s41039-021-00158-8

Fernández Polo, F. J. (2014). 'Native and non-native speaker interpersonal skills at conferences: managing self-mentions and humour', in Lyda, A. & Warchal, K. (eds.), *Occupying Niches: Interculturality, Cross-culturality and Acculturality in Academic Research*. Heidelberg, New York: Springer, pp. 163–178.

Fortanet-Gómez, I. & Ruiz-Madrid, M. N. (2016). 'Multimodal humor in plenary lectures in English and in Spanish'. *Multimodal Communication* 5 (1), pp. 55–69.

Frobenius, M. (2014). 'Audience design in monologues: how vloggers involve their viewers'. *Journal of Pragmatics* 72, pp. 59–72.

Frymier, A. B., Wanzer, M. B. & Wojtaszczyk, A. M. (2008). 'Assessing students' perceptions of inappropriate and appropriate teacher humor'. *Communication Education* 57, pp. 266–288.

Gardner, S. (2010). 'Discourse shifting for humorous effect: The Python Method'. *Okayama University Scientific Achievement Repository* 145, pp. 39–46. https://doi.org/10.18926/bgeou/40573

Geipel, A. (2018). 'Wissenschaft@YouTube. Plattformspezifische Formen von Wissenschaftskommunikation', in Lettkemann, E, Wilke, R. & Knoblauch, H. (eds.), *Knowledge in Action. Neue Formen der Kommunikation in der Wissensgesellschaft*. Wiesbaden: Springer, pp. 137–163.

Girón-García, C. & Boghiu-Balaur, S. (2021). 'A mixed-methods study of online learning in the EFL classroom'. *Revista de Lingüística y Lenguas Aplicadas* 16, pp. 95–122. https://doi.org/10.4995/rlyla.2021.13950

González García, R., Serrano Pascual, L. & Roca Martín, D. (2020). 'Perfil de las youtubers españolas dedicadas a la divulgación científica', in Castro Higueras, A., Sandulescu Budea, A. & García Orellán, R. (eds.), *Fórmulas comunicativas de vanguardia*. Madrid: Ediciones Pirámide, pp. 403–418.

Gotti, M. (2014). 'Reformulation and recontextualization in popularization discourse'. *Ibérica. Revista de La Asociación Europea de Lenguas Para Fines Específicos (AELFE)* 27, pp. 15–34.

Horng, J., Hong, J., ChanLin, L., Chang, S. & Chu, H. (2005). 'Creative teachers and creative teaching strategies'. *International Journal of Consumer Studies* 29 (4), pp. 352–358. https://doi.org/10.1111/j.1470-6431.2005.00445.x

Kher, N., Molstad, S. & Donahue, R. (1999). 'Using humor in the college classroom to enhance teaching effectiveness in "dread courses." *College Student Journal* 33 (3), p. 400.

Kress, G. (2010). *Multimodality: A Social Semiotic Approach to Contemporary Communication.* London: Routledge.

Kress, G. & van Leeuwen, T. (1996). *Reading Images: The Grammar of VisualDesign*. London: Routledge.

Kress, G., & van Leeuwen, T. (2001). *Multimodal Discourse: The Modes and Media of Contemporary Communication.* London: Edward Arnold.

Kyratzis, S. (2003). 'Laughing metaphorically: metaphor and humor in discourse'. 8th International Cognitive Linguistics Conference, University of La Rioja, Spain, 20–25 July. Theme Session: Cognitive-Linguistic Approaches to Humor. https://doi.org/10.1.1.132.9689

Luzón, M. J. (2019). 'Bridging the gap between experts and publics: The role of multimodality in disseminating research in online videos'. *Ibérica* 37, pp. 167–192.

Martin, R. A. (2006). *The Psychology of Humor: An Integrative Approach*. London: Elsevier Academic Press.

Martin, R. A., Puhlik-Doris, P., Larsen, G., Gray, J. & Weir, K. (2003). 'Individual differences in uses of humor and their relation to psychological well-being: development of the Humor Styles Questionnaire'. *Journal of Research in Personality* 37 (1), pp. 48–75. https://doi.org/10.1016/S0092-6566(02)00534-2

Miller, N., Maruyama, G., Beaber, R. J. & Valone, K. (1976). 'Speed of speech and persuasion'. *Journal of Personality and Social Psychology* 34, pp. 615–624.

Muñoz Morcillo, J., Czurda, K. & Robertson-von Trotha, C. Y. (2016). 'Typologies of the popular science web video'. *Journal of Science Communication* 15 (4), pp. 1–32.

Norris, S. (2004). *Analyzing Multimodal Interaction. A Methodological Framework.* London: Routledge.

O'Halloran, K. (2004). *Multimodal Discourse Analysis: Systemic Functional Perspectives* (K. O'Halloran, Ed.). London: Continuum.

O'Halloran, K.L., Podlasov, A., Chua, A. & Marissa, K.L.E. (2012). 'Interactive software for multimodal analysis'. *Visual Communication* 11 (3), pp. 363–381.

Osterrieder, A. (2013). 'The value and use of social media as communication tool in the plant sciences'. *Plant Methods* 9 (26).

Paek, H.-J., Kim, K. & Hove, T. (2010). 'Content analysis of antismoking videos on YouTube: message sensation value, message appeals, and their relationships with viewer responses'. *Health Education Research* 25 (6), pp. 1085–1099. https://doi.org/10.1093/her/cyq063

Pérez-Torres, V., Pastor-Ruiz, Y. & Abarrou-Ben-Boubaker, S. (2018). 'YouTuber videos and the construction of adolescent identity'. *Comunicar. Revista Científica de Comunicación y Educación* 55, pp. 61–70.

Prensky, M. (2001). 'Digital natives, digital immigrants Part 1'. *On the Horizon* 9 (5), pp. 1–6.

Reershemius, G. (2012). 'Research cultures and the pragmatic functions of humor in academic research presentations: A corpus-assisted analysis'. *Journal of Pragmatics* 44, pp. 863–875. https://doi.org/10.1016/j.pragma.2012.03.012

Robert, C. & Yan, W. (2007). 'The case for developing new research on humor and culture in organizations: toward a higher grade of manure'. *Research in Personnel and Human Resources Management* 26, pp. 205–267. https://doi.org/10.1016/S0742-7301(07)26005-0

Rogerson-Revell, P. (2007). 'Humour in business: a double-edged sword: a study of humour and style shifting in intercultural business meetings. *Journal of Pragmatics* 39 (1), pp. 4–28. https://doi.org/10.1016/j.pragma.2006.09.005

Rowley-Jolivet, E. & Carter-Thomas, S. (2019). 'Scholarly soundbites. Audiovisual innovations in digital science and their implications for genre evolution', in Luzón, M. J. & Pérez-Llantada, C. (eds.), *Science Communication on the Internet: Old Genres Meet New Genres*. Amsterdam: John Benjamins, pp. 81–106.

Scheel, T. (2017). 'Definitions, theories, and measurement of humor', in Scheel, T. & Gockel, C. (eds.), *Humor at Work in Teams, Leadership, Negotiations, Learning and Health*. SpringerBriefs in Psychology. Cham: Springer. pp. 9–29. https://doi.org/10.1007/978-3-319-65691-5_2

Scotto di Carlo, G. (2014). 'Ethos in TED talks: the role of credibility in popularised texts'. *Facta Universitatis. Series: Linguistics and Literature* 12 (2), pp. 81–91.

Scotto di Carlo, G. (2015). 'Stance in TED talks: strategic use of subjective adjectives in online popularisation'. *Ibérica* 29, pp. 201–221.

Skurka, C., Niederdeppe, J., Romero-Canyas, R. & Acup, D. (2018). 'Pathways of influence in emotional appeals: benefits and tradeoffs of using fear or humor to promote climate change-related intentions and risk perceptions'. *Journal of Communication* 68 (1), pp. 169–193. https://doi.org/10.1093/joc/jqx008

Smith, S. M. & Shaffer, D. R. (1995). 'Speed of speech persuasion: evidence for multiple effects'. *Personality and Social Psychology Bulletin* 21, pp. 1051–1060.

Swales, J. M. (2004). *Research Genres: Exploration and Applications*. Cambridge: Cambridge University Press.

Tabacaru, S. & Lemmens, M. (2014). 'Raised eyebrows as gestural triggers in interactional humor'. Biannual Meeting of the Belgium Netherlands Cognitive Linguistics Association (BeNeCLA), pp. 79–80.

Tang, L. & Sun, S. (2021). 'How does leader self-deprecating humor affect creative performance? The role of creative self-efficacy and power distance'. *Finance Research Letters* 42, 102344. https://doi.org/10.1016/j.frl.2021.102344

Teslow, J. L. (1995). 'Humor me: A call for research'. *Educational Technology Research & Development* 43, pp. 6–28.

Torok, S. E., McMorris, R. F. & Lin, W.-C. (2010). 'Is humor an appreciated teaching tool? Perceptions of professors' teaching styles and use of humor'. *College Teaching* 52 (1), pp. 14–20. https://doi.org/10.3200/CTCH.52.1.14-20

Tsakona, V. (2009). 'Language and image interaction in cartoons: towards a multimodal theory of humor'. *Journal of Pragmatics* 41 (6), pp. 1171–1188. https://doi.org/10.1016/j.pragma.2008.12.003

Tuksar, S. & Labaš, D. (2021). 'Every cloud has a silver lining': humour and persuasiveness in social media images during lockdowns'. *Medijska Istraživanja : Znanstveno-Stručni Časopis Za Novinarstvo i Medije* 27 (2), pp. 7–35. https://doi.org/10.22572/mi.27.2.1

Valeiras-Jurado, J. (2015). 'A multimodal approach to persuasion in conference presentations' in Crawford-Camiciottoli, B. & Fortanet-Gómez, I. (eds.), *Multimodal Analysis in Academic Settings: From Research to Teaching*. London: Routledge, pp. 108–132.

Valeiras-Jurado, J. & Bernad-Mechó, E. (2022). 'Modal density and coherence in science dissemination: orchestrating multimodal ensembles in online TED Talks and YouTube science videos'. *Journal of English for Academic Purposes* 58, 101118. https://doi.org/10.1016/j.jeap.2022.101118

Vásquez, C. & Aslan, E. (2021). '"Cats be outside, how about meow": multimodal humor and creativity in an internet meme'. *Journal of Pragmatics* 171, pp. 101–117. https://doi.org/10.1016/j.pragma.2020.10.006

Wakshlag, J. J., Day, K. D. & Zillmann, D. (1981). 'Selective exposure to educational television programs as a function of differently paced humorous inserts'. *Journal of Educational Psychology* 73, pp. 27–32.

Wang, Y. (2014). 'Humor in British academic lectures and Chinese students' perceptions of it'. *Journal of Pragmatics* 68, pp. 80–93. https://doi.org/10.1016/j.pragma.2014.05.003

Wanzer, M. B., Booth-Butterfield, M. & Booth-Butterfield, S. (2005). '"If we didn't use humor, we'd die": Humorous coping in health care settings'. *Journal of Health Communication* 10, pp. 105–125.

Wanzer, M. B., Frymier, A. B. & Irwin, J. (2010). 'An explanation of the relationship between instruction humor and student learning: instructional humor processing theory'. *Communication Education* 59, pp. 1–18.

Wanzer, M. B., Frymier, A. B., Wojtaszczyk, A. M. & Smith, T. (2006). 'Appropriate and inappropriate uses of humor by teachers'. *Communication Education* 55, pp. 178–196.

Welbourne, D. J. & Grant, W. J. (2016). 'Science communication on YouTube: factors that affect channel and video popularity'. *Public Understanding of Science* 25 (6), pp. 706–718.

Wycoff, E. B. (1999). 'Humor in academia: an international survey of humor instruction'. *Humor: International Journal of Humor Research* 12 (4), pp. 437–456.

Zekavat, M. (2020). 'Reflexive humour and satire: a critical review'. *The European Journal of Humour Research* 7 (4), pp. 125–136. https://doi.org/10.7592/EJHR2019.7.4.zekavat

Zhang, Q. (2005). 'Immediacy, humor, power distance, and classroom communication apprehension in Chinese college classrooms'. *Communication Quarterly* 53, pp. 109–124.

Zillmann, D., Williams, B. R., Bryant, J., Boynton, K. R. & Wolf, M. A. (1980). 'Acquisition of information from educational television programs as a function of differently paced humorous inserts'. *Journal of Educational Psychology* 72, pp. 170–180.