Digital Scientific Communication

Identity and Visibility in Research Dissemination

Edited by
Ramón Plo-Alastrué · Isabel Corona

palgrave
macmillan

Digital Scientific Communication

Ramón Plo-Alastrué • Isabel Corona
Editors

Digital Scientific Communication

Identity and Visibility in Research Dissemination

palgrave
macmillan

Editors
Ramón Plo-Alastrué
Universidad de Zaragoza
Zaragoza, Spain

Isabel Corona
Universidad de Zaragoza
Zaragoza, Spain

ISBN 978-3-031-38206-2 ISBN 978-3-031-38207-9 (eBook)
https://doi.org/10.1007/978-3-031-38207-9

This Palgrave Macmillan imprint is published by the registered company Springer Nature Switzerland AG.
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Paper in this product is recyclable.

9

Reconceptualisation of Genre(s) in Scholarly and Scientific Digital Practices: A Look at Multimodal Online Genres for the Dissemination of Science

Noelia Ruiz-Madrid and Julia Valeiras-Jurado

1 Introduction

The ways in which we communicate science have experienced a rapid evolution in the past decades. As Scotto di Carlo (2014, 2015) points out, the emergence of new communication channels has brought science closer to the public without an academic institution acting as an intermediary (see Engberg in this volume, for a deeper discussion). Among these new communication channels, the internet enjoys a privileged position. Previous studies by Luzón and Pérez-Llantada (2019), Pérez-Llantada (2021), Rowley-Jolivet and Carter-Thomas (2019, 2020) or Carter-Thomas and Rowley-Jolivet (2020) claim that it has even changed the rules of scientific communication, maximising the possibilities to reach a broader audience, blurring the boundaries between the scientific

N. Ruiz-Madrid (✉) • J. Valeiras-Jurado
Universitat Jaume I, Castelló, Spain
e-mail: madrid@uji.es; valeiras@uji.es

R. Plo-Alastrué, I. Corona (eds.), *Digital Scientific Communication*,
https://doi.org/10.1007/978-3-031-38207-9_9

community and the general public, and forcing a process of adaptation to this new and diversified audience. Digital genres, thus, seem to be the natural means for open science communication, since they afford transparency, accessibility, sharedness and collaboratively developed knowledge in science communication, which, according to Vicente-Saéz and Martínez-Sanz (2018), are the true features of open science. Open science and digital genres seem to go hand in hand to the point that the Organisation for Economic Co-operation and Development (OECD, 2015, p. 7) defines open science as making "the primary outputs of publicly funded research results—publications and the research data—publicly accessible in digital format with no or minimal restriction," and as put forward by Luzón and Pérez-Llantada (2022, p. 31) "although knowledge communication is not always open, the internet makes it easier to share ideas, data and results, thus enabling open science."

In this chapter, we want to focus our attention on one internet-based genre that has gained increasing importance as a tool to communicate science to a broader audience: popular science online videos. These are short, professionally produced videos of approximately 10 minutes, in which a varied and validated scientific content is disseminated to the general public. As pointed out by Valeiras-Jurado and Bernad-Mechó (2022), they are a relatively recent phenomenon and they have not yet been defined as a genre, but it can be safely claimed that they share characteristics of what some scholars have called scifotainment or edutainment genres (Pérez-Llantada, 2021; Sancho Guinda, 2019; Zhang & O'Halloran, 2013).

A salient characteristic of these videos is their multimodal nature, which has been pointed out in previous research. Boy et al. (2020) describe them as

> well-organized multimodal arrangements consisting of a variety of visual and verbal modes like stills, moving images, text, spoken language, sounds, animations, graphics, etc. which is a much more complex system of communication than text only. (p. 4)

These authors have classified scientific online videos according to their use of semiotic modes. They distinguish between:

1. *Presentation films*, in which the speaker talks directly to the camera and answers some scientific questions. In addition to spoken language, they use other modes such as text over visuals, background images, animations, gestures and facial expressions.
2. *Expert films*, in which an expert discusses a topical field of research. These videos contain more animations, insertion of user comments, addresses to users and so on.
3. *Animation films* show artificial moving images to illustrate a scientific issue.
4. *Narrative explanatory films* are based on a general question that is answered through arguments that follow logical reasoning. They often contain elements from the previous types, combining narrative and informative elements in an entertaining story. They use mainly moving image material.

According to Valeiras-Jurado and Bernad-Mechó (2022), something that distinguishes these videos is that they combine modes that are orchestrated by presenters as they speak to the camera, which can be classified as embodied modes, and other modes that are added to the ensemble during montage, which can be called filmic modes. This is a possibility afforded by the online media and turns meaning-making in these videos into a very complex and rich process. It also brings to the fore the importance of co-authorship in this genre: in popular science online videos, multimodal ensembles are collaboratively orchestrated by the presenter and the person in charge of montage (Xia & Hafner, 2021). This peculiarity brings with it the extra challenge of ensuring the internal coherence of the ensemble, by making sure that all modes contribute seamlessly towards the same communicative aim (Valeiras-Jurado, 2019; Valeiras-Jurado & Bernad-Mechó, 2022).

The process of meaning-making in popular science online videos is further challenged by the need to account for the knowledge asymmetry between presenters and audience, that is, presenters have considerably more knowledge than the audience about the topic they are discussing (Kastberg, 2011). Therefore, scientific content needs to be adapted by means of a process of recontextualisation (Luzón & Pérez-Llantada, 2019). According to Bezemer and Kress (2008), recontextualisation involves four rhetorical principles:

(a) *Selection* of the content that is relevant for the new audience
(b) *Arrangement* of the content in the way that best fits the audience and the communicative purpose
(c) *Foregrounding* of the elements that are particularly significant
(d) *Social reposition* that is redefining the relationship between the speaker/writer/presenter and the audience

Previous studies have investigated the way these principles are put into practice, with special focus on academic and scientific discourse. Different taxonomies of recontextualisation strategies have been proposed. Luzón (2019), for example, identifies four groups of strategies depending on their function: (a) strategies to build credibility, (b) strategies to build persuasive arguments, (c) strategies to tailor information to the assumed knowledge of the audience and (d) strategies to engage the audience. She also approaches these recontextualisation strategies from a multimodal perspective, acknowledging the role of static and moving image, among others.

Carter-Thomas and Rowley-Jolivet (2020) have investigated two of the groups proposed by Luzón (2019) in Three-Minute Theses presentations: strategies to tailor information and engagement strategies. Among the first they include selecting content, definitions, explanations in layman's language, paraphrases, analogies, examples from everyday life and scenarios (i.e., the audience is asked to imagine a particular situation). Among the second, they report the use of catchy titles, visual impact (e.g., through striking images or the presenter's presence on stage), various personalisation devices (e.g., gestures, smiles, personal pronouns), questions, humour and "street cred" (i.e., a common framework based on shared cultural values rather than scientific know-how).

Valeiras-Jurado et al. (2018) suggest a taxonomy of persuasive strategies found in a corpus of conference presentations and research dissemination talks. They identify strategies such as anticipation and control of responses (i.e., predicting potential responses from the audience and prompting desirable ones), attention getting (i.e., raising and maintaining the interest of the audience), emphasis (i.e., highlighting parts of the message to make them more salient), evaluation (i.e., assessing something and implicitly inviting the listener to accept this assessment), processing

aids (facilitating understanding of the message), projection of the context of interaction (i.e., presenting information as new vs. given; or agreed upon vs open to discussion) and rapport (i.e., building a relationship of sympathy and mutual understanding with the audience).

To bring together the two pillars of our theoretical framework, that is, recontextualisation and multimodality, Bezemer and Kress define recontextualisation from a multimodal perspective as follows:

> moving meaning material from one context with its social organization of participants and its modal ensembles to another, with its different social organization and modal ensembles. Meaning material always has a semiotic realization, so recontextualization involves the re-presentation of the meaning materials in a manner apt for the new context in the light of the available modal resources. (2008, p. 184)

In the case of popular science videos that concern our study, recontextualisation implies moving scientific content to a novel online context in which new combinations of semiotic modes (i.e., multimodal ensembles) become available in order to meet the audience's needs and expectations, which are no longer the same as those from experts.

In this chapter it is our intention to unveil multimodal recontextualisation practices in popular science videos. In particular, we pose the following research questions:

- RQ1: What modes and modal configurations can be identified in popular science videos?
- RQ2: What recontextualisation strategies are used in these videos?
- RQ3: How are these strategies realised multimodally?

2 Corpus and Method

Multimodal ensembles refer to the orchestration of different modes to produce a specific meaning that is inferred from the interrelation among the specific modes involved. The communicator orchestrates multimodal

ensembles, where each mode has a function (Kress, 2010) and "each mode is partial in relation to the whole meaning" (Jewitt & Kress, 2003, p. 3). In order to explore the nature of the multimodal ensembles employed by speakers to recontextualise information in the online science dissemination videos, we follow a multimodal analysis approach. A more detailed account of this methodology can be found in Sect. 2.2.

2.1 The Corpus

Four science dissemination online videos available on YouTube were selected for the present study: (a) *Why Megalodon (Definitely) Went Extinct*, (b) *Why Are We the Only Humans Left?*, (c) *Why the Muon g-2 Results Are So Exciting!* and (d) *What Is the Magic Russian Diamond?* Videos (a) and (b) belong to the anthropology field and videos (c) and (d) deal with physics. All of them were hosted in the PBS multi-platform media (https://www.pbs.org/) at the time the analysis was carried out. PBS is a private, non-profit corporation, which defines itself as "a trusted window to the world" and "America's largest classroom" that offers programming for a wide range of ages, interests and genres about science, history, culture, great literature and public affairs. The contents broadcast are aimed at a non-expert audience who wants to be updated or teachers who may use the contents for pedagogical purposes. The first video, *Why Megalodon (Definitely) Went Extinct*, has a duration of 11 min 12 sec and it is the seventh episode of season 2 of the channel *Eons*. This channel offers episodes on the history of life on Earth from the Archean Eon through the Mesozoic Era, that is, from the so-called Age of Dinosaurs to the end of the most recent Ice Age. This particular episode is narrated by actress and science communicator Kallie Moore and describes the evolution of the ancient species, particularly the Megalodon and its eventual extinction. The narrator discusses the fossil evidence and the effect the extinction of the Megalodon had on the ocean habitat and the current species. The second video, *Why Are We the Only Humans Left?* is 7 min 31 sec and it is the 30th episode of season 4 of the channel *Be Smart* presented by Joe Hanson, a science writer, biologist and YouTube educator.

This particular episode investigates human ancestry and explains why *Homo sapiens* are the only survivors on the human evolutionary tree and offers a new view of the Neanderthals. The third video, *Why the Muon g-2 Results Are So Exciting*, is the longest of the videos selected with a length of 12 min 35 sec. It is the 13th episode of season 7 of the channel *Space Time*, which deals with space and astrophysics. This channel is presented by Mathew O'Dowd, an astrophysicist who studies black hole physics and received his PhD from Columbia University. The chapter we analyse explains the results obtained by one of the most promising experiments in the world of physics: Muon G-2. Finally, the fourth video, *What Is the Magic Russian Diamond?* has a duration of 8 min 27 sec and it is episode 10 of season 3 of the channel called *Physics girl*. This channel is presented by science communicator Dianna Cowern. It explores the field of physical sciences and presents experiments, demonstrations and new discoveries. The episode analysed in the present paper describes the properties and applications of one of the most unusual diamonds in the world because of its properties and composition, that is, the Russian diamond.

The aim of the four videos is the dissemination of scientific content to a non-expert audience and mainly for pedagogical purposes. Therefore, these videos may resort to different semiotic resources and rhetorical strategies to recontextualise the scientific content and eventually achieve their communicative purpose.

The total size of the corpus is 39 m 45 s, which does not allow for quantitatively based generalisations, but it is valid for qualitative analyses considering the duration of the videos analysed (i.e., no longer than 13 min). It is also in line with similar previous multimodal studies (Luzón, 2019; Valeiras-Jurado & Ruiz-Madrid, 2019; Ruiz-Madrid, 2021; Valeiras-Jurado & Bernad-Mechó, 2022), which cannot afford to use larger corpora due to their minute level of data analysis and the lack of automating tools. Table 9.1 provides an overview of the corpus.

As Table 9.1 shows, the shortest video was 7 m 31 s and the longest one was 12 m 35 s. The corpus was varied in terms of disciplines: two videos from anthropology and two from physics. All of them were professionally edited and employed a wide variety of semiotic and filmic modes (Valeiras-Jurado & Bernad-Mechó, 2022).

Table 9.1 Description of the corpus

Video	Topic	Discipline	Speaker	Duration
Why Megalodon (Definitely) Went Extinct	Megalodon/ Sharks	Anthropology	Male	11 min 12 sec
Why Are We the Only Humans Left?	Prehistoric human beings	Anthropology	Female	7 min 31 sec
Why the Muon g-2 Results Are So Exciting!	Particle Physics	Physics	Male	12 min 35 sec
What Is the Magic Russian Diamond?	Composition of diamonds	Physics	Female	8 min 27 sec

2.2 Method and Instruments

In this research, a multimodal discourse analysis (MDA) approach (Luzón, 2019; Ruiz-Madrid, 2021; Valeiras-Jurado & Bernad-Mechó, 2022) is adopted to analyse and gain further understanding on how recontextualisation is multimodally conveyed in online science videos. From this perspective, we focus on how the different semiotic modes are employed in these videos and more precisely in the multimodal ensembles resulting when recontextualising the information. As noted by Paltridge (2012), MDA results in too much data for a feasible analysis, and therefore, it is necessary to select specific modes to look into. Accordingly, we made a first selection of modes informed by previous studies (Querol-Julián, 2011; Valeiras-Jurado & Ruiz-Madrid, 2019), which can be summarised as follows:

(a) Words (written and oral discourse), mainly those used as recontextualisation strategies (Rowley-Jolivet & Carter-Thomas, 2019; Luzón, 2019; Valeiras-Jurado et al., 2018)
(b) Four types of kinesics: gestures, head movement, facial expression (Kendon, 2004) and gaze and eye contact (Argyle et al., 1981) as well as the way they interact with speech (Ladewig, 2013; Müller, 2013)
(c) Image, music, sound and visual effects (Valeiras-Jurado & Bernad-Mechó, 2022)

This list was completed with more modes suggested by the corpus-driven analysis such as graphs and equations, clothing or artefacts, adopting an inductive approach to video data (Goldman et al., 2007). The final list of modes that were employed for the multimodal analysis is the following: spoken words, gestures, head movements, face expression, eye contact, image, written words, graphs and equations, video, music, sound effects, visual effects, clothing and artefacts and physical objects.

Concerning the recontextualisation strategies, we again used a corpus-driven approach that was informed by previous studies (Rowley-Jolivet & Carter-Thomas, 2019; Luzón, 2019; Valeiras-Jurado et al., 2018). Accordingly, nineteen strategies suggested in these previous studies were considered and classified into three different groups according to their rhetorical aim, namely, (a) strategies to tailor information, (b) strategies to engage the audience and (c) strategies to build credibility (see Sect. 1 for a full discussion). A detailed description of the recontextualisation strategies found in the present study can be found in Sect. 3.

A computer-aided multimodal analysis of the four videos was conducted with the software MMAV (Multimodal Analysis Video) (O'Halloran et al., 2015). This multimodal annotation tool makes it possible to transcribe and annotate audio and video files and to organise transcriptions and annotations in different layers. For the multimodal analysis the layer structure shown in Fig. 9.1 was used:

As shown in Fig. 9.1, the software is organised into three components: a set of media files, a set of categorical descriptions (i.e., systems) used in the annotation and a set of annotation units (with time-stamped and spatial coordinates). The software provides access to plain text, images, sound and videos, which cover to a major extent the ways multimodal phenomena can be digitally recorded. We imported the media file and designed a set of annotation systems with the list of modes mentioned above. As the corpus-driven analysis of the different videos was carried out, this set of annotation systems was modified accordingly. The MMAV offers a "state machine" tool that affords the visualisation of the annotation results as well as their quantification and the relationship among the created systems in a visual way, as shown in Fig. 9.2.

The videos were individually visualised and annotated by both researchers in order to ensure validity. Most disagreements concerned the

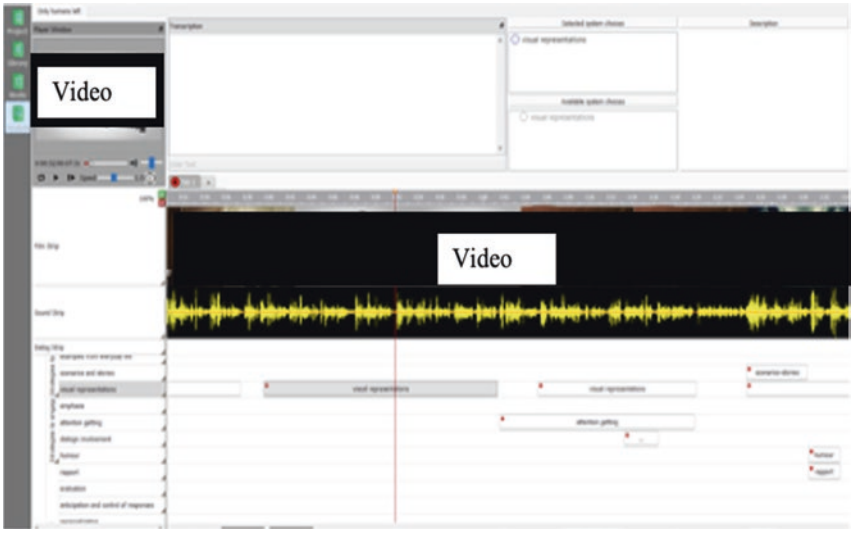

Fig. 9.1 Screenshot of the analysis of *Why Are We the Only Humans Left?* in MMAV

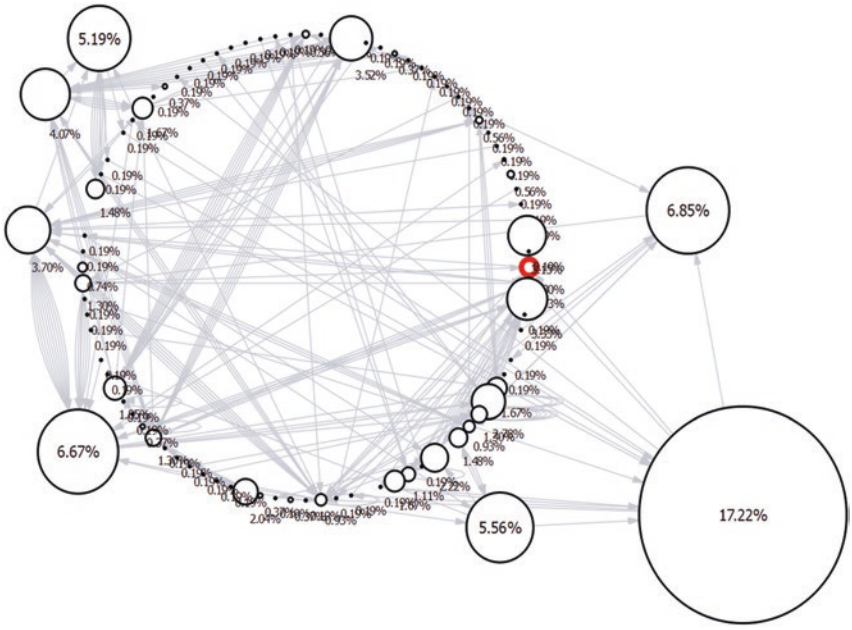

Fig. 9.2 Screenshot of the visualisation of results in *Why Are We the Only Humans Left?* provided by the state machine tool

annotation of the type of strategies. Consensus was reached by taking into account the communicative aim of the whole multimodal ensemble. In addition, it was acknowledged that modes can frequently have several functions at the same time and that the boundaries are never clear-cut.

3 Results and Discussion

In this section, we present and discuss which multimodal ensembles are employed to recontextualise information in online videos for science dissemination.

Regarding RQ1, that is, the modes and modal configurations that can be identified in popular science videos, we adopted an inductive approach to video data (Goldman et al., 2007) to identify the semiotic modes that contribute to conveying meaning, as explained in Sect. 2. The identification was made first individually, and the few inconsistencies between researchers discussed. The agreed list of modes, which was used as the basis for our coding library, is shown in Table 9.2.

Table 9.2 Modes used in the coding library

Mode	Instances from the corpus
Spoken words	That is, what the presenter says
Written words	That is, text that appears on screen
Gestures	That is, movements of the hand and arms
Head movements	For example, tilt, shake, nod
Face expression	For example, frown, smile
Eye contact	For example, gazing at the camera or somewhere else
Graphs and equations	For example, a chart, Einstein's equation $E = mc^2$
Image	Including real (e.g., photographs of people, animals and objects) and cartoons or depictions
Video	Including real and animated
Music	It is frequently present at the beginning and end of the videos, and is also hearable quieter, as background, during the video
Sound effects	For example, an alarm, a typing sound
Visual effects	For example, movements in images and in the position of the presenter
Clothing	The clothes worn by the presenter
Artefacts	Physical objects manipulated in the videos

The use of *video* as one of the modes requires some further explanation, since the communicative events we are analysing are also videos in themselves. We consider *video* as a mode (or rather a collection of modes including other modes like image, sound and music) when it is pre-recorded and embedded in the episode (e.g., an interview with a scientist in *What Is the Magic Russian Diamond?*). It is a combination of semiotic resources that is added to the episode during montage, and, unlike gestures or face expression, not controlled by the presenter in the video. Together with music, sound effects and visual effects, they are part of what Valeiras-Jurado and Bernad-Mechó (2022) call filmic modes. Likewise, the last two modes in Table 9.2 (i.e., *clothing* and *artefacts*) may not be so straightforward as a way of conveying meaning. We consider that clothes become a mode when they are worn intentionally. This is the case, for example, of a T-shirt shown in *Why the Muon g-2 Results Are So Exciting!* displaying the names and logos of PBS studios and the name of the channel, or a lab coat used in *What Is the Magic Russian Diamond?* to engage in scientist lecture mode, as Fig. 9.3 shows.

Artefacts are physical objects that are being manipulated. They also become a mode, especially when they are used to visually illustrate what

Fig. 9.3 Examples of clothing conveying different strategies in *Why the Muon g-2 Results Are So Exciting!* and *What Is the Magic Russian Diamond?*

Fig. 9.4 Example of the use of artefacts for visualisation purposes in *What Is the Magic Russian Diamond?*

the presenter is explaining. Figure 9.4 shows the use of gummies to visually represent the structure of a diamond in *What Is the Magic Russian Diamond?*

The multimodal annotation revealed that modes are used with great flexibility and creativity, and as a result, it was not possible to identify clearly recurrent multimodal ensembles. However, we were able to identify modes that tended to appear together. For example, *spoken words* almost always tend to co-occur with *gestures* whenever the presenter is visualised on screen. Another frequent combination is *image* and *visual effects*. In fact, we noticed that these videos avoid static images and prefer images that move or change in some way. Also text, which is used less frequently than images, tends to be animated in some way, for example, with a pop-up effect, disappearing from screen and a special typography. These semiotic resources, which for the purposes of this study we have gathered under the filmic mode *visual effects* (rather than as part of *written words*, since they also affect images), have been shown to contribute to the multimodal ensemble in previous studies (Stöckl, 2014; van Leeuwen, 2006). We believe they provide the videos with greater dynamism and help retain viewers' attention. Figure 9.5 illustrates this trend.

We also noticed a certain regularity in the sequencing of modes. We found two recurrent sequences in our corpus:

Fig. 9.5 Example of the use of animated written words

Fig. 9.6 Sequence in *Why the Muon g-2 Results Are So Exciting!*

(1) A visualisation of the presenter speaking leads to an *image*, *text* or *graph* appearing in the background. This image stays static very briefly, and then a *visual effect* is applied, which makes the *image* move, change size, disappear and so on.

Figure 9.6 shows this sequence in the *Muon* video. The ensemble begins with the *speaker* talking to the camera and using *gestures* as he speaks, and then an *image* is shown in the background. This image stays static very briefly and then movement is introduced through *visual effects* (in this case the balance tips).

Another example from the *Megalodon* video is provided in Fig. 9.7, including the annotations of the modes. As in the previous case, we see

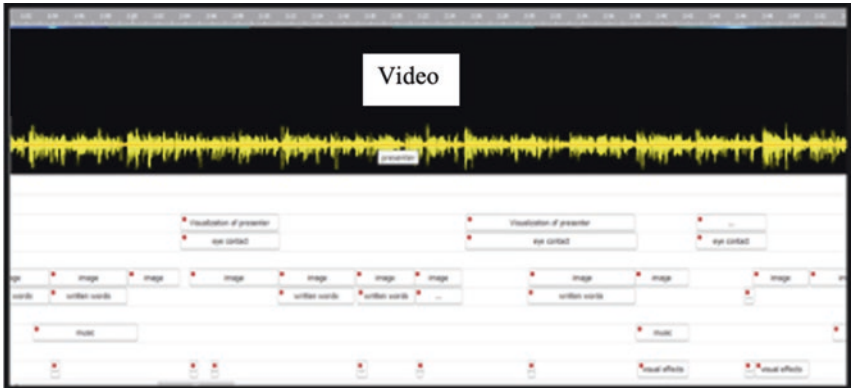

Fig. 9.7 Annotated sequence in *Megalodon*

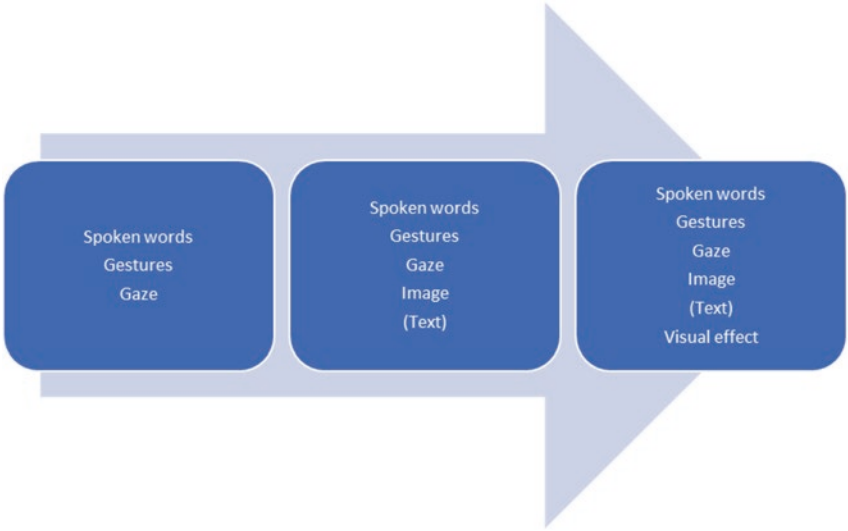

Fig. 9.8 Description of the increasing complexity of the multimodal ensembles

how a visualisation of the presenter speaking, gesturing and gazing at the camera is followed by an *image* accompanied by *written text*, which is then animated through *visual effect*. The cycle is then repeated.

The increasing complexity of these ensembles is represented in Fig. 9.8.

Fig. 9.9 Sequence in *Why Are We the Only Humans Left?*

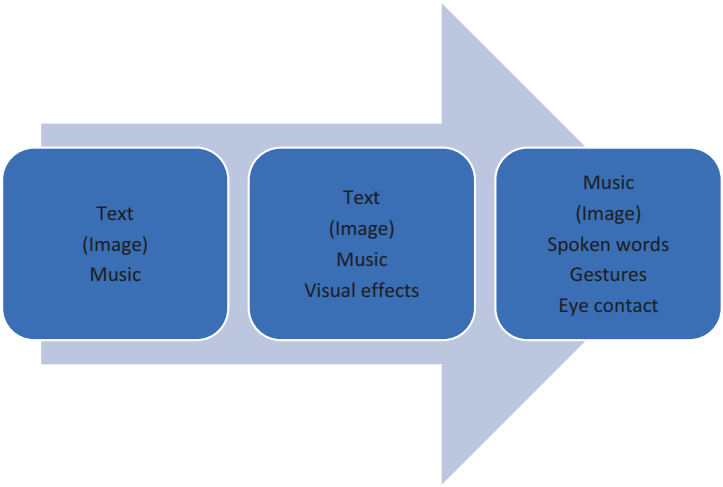

Fig. 9.10 Description of the evolution of the multimodal ensemble in *Why Are We the Only Humans Left?*

(2) Text appears on screen, background *music* is heard, visual *effects* are applied (e.g., letters move, change colour, resize), an *image* may be added and a fading of the screen leads to a visualisation of the presenter speaking. This sequence is used in *Why Are We the Only Humans Left?* to explicitly mark and name sections. An example can be seen in Fig. 9.9.

The evolution of the ensemble is represented in Fig. 9.10.

Our second research question (RQ2) probed into the recontextualisation strategies that are used in these videos. As explained in Sect. 2, the identification of strategies was informed by taxonomies suggested in previous literature (Luzón, 2019; Carter-Thomas & Rowley-Jolivet, 2020; Valeiras-Jurado et al., 2018), but as it was the case with modes, we adopted

a corpus-driven, inductive approach, and contributed to these taxonomies when needed. The multimodal analysis revealed that the following recontextualisation strategies are present in our corpus (see Table 9.3).

Table 9.3 Recontextualisation strategies present in our corpus

Rhetorical aim	Strategy	Description
Strategies to tailor information	Selection of content	Excluding what is considered too difficult or not interesting
	Paraphrases	Repeating using different words
	Analogies	Comparisons between one thing and another for the purpose of clarification
	Examples from everyday life	Bringing content closer referring to common everyday experiences
	Scenarios, stories	That is, "picture yourself"
	Visual representations	Pictures, video, iconic gestures, etc. that clarify content (see Fig. 9.4)
Strategies to engage the audience	Emphasis	Highlighting what is considered surprising, novel or immediately applicable
	Attention retention	Making sure the viewer stays until the end of the video
	Dialogic involvement	Questions and addresses to the audience, inclusive pronouns
	Anticipation and control of responses	Presenting something as known, as interesting or relevant, anticipating audience questions or remarks
	Humour	Jokes, irony (Fig. 9.3)
Strategies to build credibility	Rapport	Inclusive language, smiles
	Evaluation	For example, evaluative adjectives and intensifying adverbs
	Personalisation	Self-mentions, personal information
	Mentions of network	Conferences and other scientific events, colleagues, subscribers, naming the channel
	Mentions of patrons and supporters	For example, PBS studios, companies (Fig. 9.3)
	Mentions of scientific sources	Publications, interviews with experts
	Street credibility	References to popular culture and knowledge (e.g., films, books, characters, etc.)
	Cross-referencing	For example, mentioning other episodes (see Fig. 9.10)

Fig. 9.11 Cross-referencing strategy in *Muon*

We also noticed that *selection of content* did not allow a time-aligned, annotation-based analysis, as the rest of the strategies. Rather, presenters select content beforehand, as they prepare the script. For this reason, we consider this strategy as a first step towards recontextualisation and a prerequisite for other strategies to happen. In fact, in the case of the Muon video, we can observe how selection of content leads into *cross-referencing*, as the speaker refers the audience to other episodes for a deeper discussion of content that is not included in the current one. Figure 9.11 shows an example.

It is also important to note that the boundaries between strategies are not clear-cut. It is not always possible to determine with accuracy where one ends, and another begins. This is the case, for example, of the strategies *emphasis* and *attention getting*, which in some cases can only be differentiated taking into account intensity and duration (i.e., we consider attention getting as sustained in time and more intense than emphasis).

Our third research question (RQ3) concerns the multimodal realisation of these strategies. A first outcome of our analysis is that even strategies that are rooted in the tradition of linguistic-based discourse analysis and are therefore conceived as being realised through language, can also be conveyed through a variety of modes. For example, analogies can be conveyed through *images*, *mentioning patrons* can be enacted through

"Yes, this will be on the test and it's also important for the next thing I'm going to say

Fig. 9.12 Example of modal density and complexity of *Muon* video

clothes (see Fig. 9.3) and cross-references to other episodes sometimes take the form of a *deictic gesture* pointing at a pop-up banner with the title of the episode. Figure 9.12 provides a better insight on the modal density and complexity that these videos can achieve.

In this excerpt of the video *Why the Muon g-2 Results Are So Exciting!* we notice a variety of modes at play. While *visualising the presenter*, we also see an *equation* accompanied by *written text*. The speaker introduces a humorous pun by addressing the viewer saying: "Yes, this will be on the test." Synchronously, he *gazes* at the camera, makes a *warning sign* pointing at the audience and he raises his eyebrows. Simultaneously, we can also see the PBS logo in the top left corner of the screen and in the presenter's T-shirt, which also shows the name of the channel Spacetime. This multimodal ensemble realises a series of recontextualisation strategies. The presenter is introducing humour and building a fictional dialogue with the viewer. He is also building rapport and directing the response of the audience by showing this is relevant to understand what is coming next. Finally, his *clothing* provides mentions of patrons and supporters and mentions of network (PBS and Spacetime). Table 9.4 shows the recontextualisation strategies in this excerpt and their modal realisations.

A second example of the multimodal realisation of strategies is provided in Fig. 9.13, which corresponds to the beginning of the video *Why Are We the Only Humans Left?*

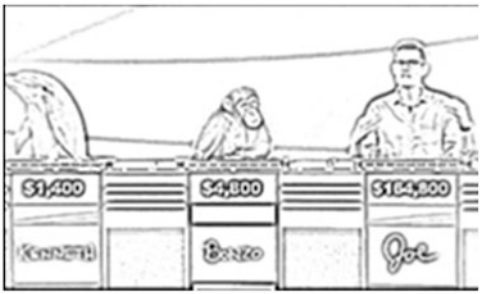

Fig. 9.13 Multimodal realisation of recontextualisation strategies in *Why Are We the Only Humans Left?*

Table 9.4 Description of multimodal realisation of recontextualisation strategies in *Muon*

Engaging the audience			Building credibility		
Dialogic involvement	Humour	Anticipation and control of responses	Rapport	Mentions of patrons	Mentions of network
Spoken words Gestures Eye contact Face expression	Spoken words Gestures Eye contact Face expression	Spoken words Gestures Eye contact Face expression Equation Written text	Spoken words Gestures Eye contact Face expression	Clothing	Clothing

In this excerpt, there is once more a variety of modes contributing meaning. We can notice the use of *image* and *text*. The image is not static but moves through *visual effects*. At the same time, the presenter is *talking* and *gazing* at the camera while *gesturing* (e.g., pointing at himself as he says "us"). All throughout, *music* can be heard. This multimodal ensemble realises a number of recontextualisation strategies. On the one hand, the *music*, *image* and *visual effects* are a way of getting the attention of the audience at the onset of the video. The images also act as a visual representation of the comparison that the speaker is establishing between humans and animal species. At the same time, they also refer to popular

culture (i.e., TV contests) to build street credibility, that is, a common framework based on shared cultural values rather than scientific know-how. Finally, the direct address to the audience ("look around") and the use of "us" as the speaker keeps *eye contact* and *points* inwards at himself are all a way to create dialogic involvement. Table 9.5 summarises the multimodal recontextualisation strategies in this excerpt.

The analysis also showed that some strategies tend to be realised through multimodal ensembles that show a preference for a particular mode. In other words, we can notice certain correlations between some strategies and some modal realisations. This is the case of the strategy visual representations that is always realised through an ensemble that contains *image*, *video* or *artefacts*, and may additionally contain other modes like *spoken words*, *gestures* or *music*. Figure 9.14 from *What Is the Magic Russian Diamond?* shows the use of a coin as a reference to explain the size of the diamond.

Table 9.5 Description of multimodal realisation of recontextualisation strategies in *Why Are We the Only Humans Left?*

Tailoring information	Engaging the audience		Building up credibility
Visual representation	Attention getting	Dialogic involvement	Street credibility
Image Written words Visual effects	Image Visual effects Music	Spoken words Gestures Music Eye contact	Images Written words Visual effects

Fig. 9.14 Visual representation in *What Is the Magic Russian Diamond?*

Fig. 9.15 Multimodal realisation of emphasis in *Why Are We the Only Humans Left?*

This is probably a result of the affordances provided by each mode. The strategy visual representations, as its name indicates, is highly dependent on visual elements as a medium (i.e., its material form is inherently visual). It is therefore not surprising that the modes that are used to enact this strategy are also based on visual elements as media: an *image*, a *video* (which can be considered a moving image) or a physical object that is manipulated for the viewer to see. These visual elements also have the ability to convey meaning in a more idiosyncratic way and therefore can facilitate and speed the clarification process, in the same way as a map indicates the way faster and more effectively than written or spoken directions.

We find a similar tendency with the strategy emphasis, which tends to be realised through ensembles that contain *sound* and *visual effects*. An example from *Why Are We the Only Humans Left?* is shown in Fig. 9.15. In this excerpt of the video, we see a cartoon-like depiction of a Neanderthal disappear with a hissing sound and clouds appearing in its place.

We believe this is once more due to the affordances of each mode. *Visual* and *sound effects* have a dynamising effect on the video and therefore are a particularly suitable way to highlight certain elements and make them stand out for the viewer.

Finally, the multimodal analysis also revealed that presenters do not only use a variety of modes to realise recontextualisation strategies. In doing so, they also interact with their online media. For example, they seem to be very aware that viewers access their videos through the PBS webpage or through YouTube, and that they can make comments, or

"we have you covered, episode list in the description"

Fig. 9.16 *Muong* speaker interacting with the online media

browse to watch other videos from the episode list. Not only that, they also seem to be very conscious of how this information shows up for the viewers, to the extent that they even make *deictic gestures* up or down depending on where this information appears on screen. Figure 9.16 shows how the presenter *points down* with both hands when referring to the episode list that shows up below the player window on the website.

4 Conclusions

In this chapter, we have undertaken a multimodal analysis of recontextualisation in four science dissemination videos. The analysis has revealed that these videos display a high number of modes and rich, seamlessly woven multimodal ensembles that realise a number of recontextualisation strategies.

Concerning our RQ1, our results show that embodied modes that inevitably accompany oral discourse (i.e., *gestures*, *face expression*, *head movements*) contribute meaning, for example, directing responses of the audience, or providing emphasis. Also modes that are not so evident as meaning-making resources play a crucial role in recontextualising scientific content. *Artefacts*, for example, can provide visual representations that facilitate understanding of difficult concepts. Likewise, *clothing* can

serve the purpose of displaying the names of patrons or achieve a humorous effect. The analysis has also brought to the fore the use of *filmic modes* as a consequence of the online media, which are particularly prominent in this genre. Presenters achieve a livelier and more effective interaction with their audiences if they show awareness of the media through which these audiences access their videos and the way the information is organised on their screens (e.g., where the comment list is, or where the title of the episode appears). Despite these modes being used with great flexibility and creativity, it is not possible to identify recurrent multimodal ensembles in these videos. However, the analysis of the videos has revealed some modal co-occurrences, for instance *spoken words* + *gestures* + *eye contact*, and some preferences in the use of modes, for example the use of *animated images* or *animated text*. Furthermore, some regularity in the sequencing of modes has also been identified. In these cases, the modes are sequenced in a regular pattern during a part of the video making the multimodal ensemble more complex and dense as the sequence progresses (see Figs. 9.8 and 9.9).

As for RQ2, our analysis shows how presenters use a variety of recontextualisation strategies to tailor the information to the assumed knowledge of the target audience, engage the audience and build credibility. These objectives are clear from the onset if we pay attention to the titles of the videos. Three of them take the form of a "why" question and the fourth is phrased as a "what" question. These titles raise curiosity and prepare the audience to expect content that is not only accessible and interesting, but also engaging, thus creating a receptive frame of mind. Results show that in some cases, the boundaries between strategies are not clear-cut, and it is not always possible to determine with accuracy where one ends, and another begins. Our corpus-driven approach has allowed us to revise and complete previous taxonomies with strategies that have not been applied to online genres so far, such as "anticipation and control of responses." (see Tables9.5)

Regarding RQ3, as our analysis has shown, recontextualisation strategies, although rooted in linguistic tradition, are realised multimodally. On the one hand, one multimodal ensemble can realise a number of recontextualisation strategies (see Tables 9.4). On the other hand, some strategies tend to be realised through multimodal ensembles that show a

preference for a particular mode. In other words, certain correlations between some strategies and some modal realisations have been found (e.g., *visual representations-images*).

The corpus-driven approach adopted in this study and the multimodal analysis of the corpus selected have helped us revise and complete existing taxonomies of both modes and strategies, contributing in this way to our knowledge of science dissemination, digital genres and multimodality.

The study presented in this chapter is limited in scope, since the corpus includes four videos from two disciplines. Further research with larger corpora would help to identify genre traits and to further explore recurrent ensembles and sequences of modes. This would expand our understanding of this emerging genre and of multimodal recontextualisation practices.

Acknowledgements This research has been supported by the *Ministry of Science, Innovation and Universities* [grant number PGC2018-094823-B-I00] and Research Promotion Plan at Universitat Jaume I (Spain) [grant number UJI-B2020-09].

References

Argyle, M., Ingham, R., Alkema, F., & McCallin, M. (1981). The different functions of gaze. In A. Kendon (Ed.), *Non-verbal communication, interaction and gesture* (pp. 221–237). Mouton.

Bezemer, J. A., & Kress, G. (2008). Writing in multimodal texts: A social semiotic account of designs for learning. *Written Communication, 25*(2), 166–195.

Boy, B., Bucher, H.-J., & Christ, K. (2020). Audiovisual science communication on TV and YouTube. How recipients understand and evaluate science videos. *Frontiers in Communication, 5*, 1–18.

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

Goldman, R., Erickson, F., Lemke, J., & Derry, S. J. (2007). Selection in video. In S. Derry (Ed.), *Guidelines for video research in education: Recommendations from an expert panel* (pp. 19–27). Data Research and Development Center at the University of Chicago.

Jewitt, C., & Kress, G. (Eds.). (2003). *Multimodal literacy*. Peter Lang.

Kastberg, P. (2011). Knowledge asymmetries: Beyond 'to have and have not'. *Fachsprache: Internationale Zeitschrift für Fachsprachenforschung -didaktik und Terminologie, 33*(3–4), 137–151.

Kendon, A. (2004). *Gesture: Visible action as utterance*. Cambridge University Press.

Kress, G. (2010). *Multimodality: A social semiotic approach to contemporary communication* (2nd ed.). Taylor & Francis.

Ladewig, S. H. (2013). Creating multimodal utterances: The linear integration of gestures into speech. In C. Muller, A. Cienki, E. Fricke, S. Ladewig, D. McNeill, & S. Teßendorf (Eds.), *Body-language-communication: An international handbook on multi-modality in human interaction* (Vol. I, pp. 1662–1677). De Gruyter Mouton.

Luzón, M. J. (2019). Bridging the gap between experts and publics: The role of multimodality in disseminating research in online videos. *Ibérica. Journal of the European Association of Languages for Specific Purposes, 37*, 167–192.

Luzón, M. J., & Pérez-Llantada, C. (2019). Connecting traditional and new genres: Trends and emerging themes. In M.-J. Luzón & C. Pérez-Llantada (Eds.), *Science communication on the Internet: Old genres meet new genres* (pp. 1–18). https://doi.org/10.1075/pbns.308.01luz

Luzón, M. J., & Pérez-Llantada, C. (2022). *Digital genres in academic knowledge production and communication. Perspectives and practices*. Multilingual Matters. https://doi.org/10.21832/9781788924726

Müller, C. (2013). Gesture as a medium of expression: The linguistic potential of gestures. In C. Muller, A. Cienki, E. Fricke, S. Ladewig, D. McNeill, & S. Teßendorf (Eds.), *Body-language-communication: An international handbook on multi-modality in human interaction* (Vol. I, pp. 202–217). De Gruyter Mouton.

O'Halloran, K. L., Tan, S., & Marissa, K. L. E. (2015). Multimodal analysis for critical thinking. *Learning, Media and Technology, 42*, 147–170.

OECD. (2015). *Making open science a reality, OECD science, technology and industry policy papers*. OECD Publishing (No. 25).

Paltridge, B. (2012). *Discourse analysis* (2nd ed.). Bloomsbury.

Pérez-Llantada, C. (2021). Genres and languages in science communication: The multiple dimensions of the science-policy interface. *Language & Communication, 78*, 65–76.

Querol-Julián, M. (2011). *Evaluation in discussion sessions of conference paper presentations: A multimodal approach*. LAP Lambert Academic Publishing GmbH & Co. K.G., Saarbrücken.

Rowley-Jolivet, E., & Carter-Thomas, S. (2019). Scholarly soundbites. Audiovisual innovations in digital science and their implications for genre evolution. In M.-J. Luzón & C. Pérez-Llantada (Eds.), *Science communication on the Internet: Old genres meet new genres* (pp. 81–106).

Rowley-Jolivet, E., & Carter-Thomas, S. (2020). Three minute thesis presentations: Recontextualisation strategies in doctoral research. *Journal of English for Academic Purposes, 48*, 1–14. https://doi.org/10.1016/j.jeap.2020.100897

Ruiz-Madrid, M. N. (2021). A multimodal discourse approach to research pitches. *Journal of English for Academic Purposes, 52*, 1–15.

Sancho Guinda, C. (Ed.). (2019). *Engagement in professional genres*. John Benjamins.

Scotto di Carlo, G. (2014). The role of proximity in online popularizations: The case of TED talks. *Discourse Studies, 16*(5), 591–606.

Scotto di Carlo, G. (2015). Stance in TED talks: Strategic use of subjective adjectives in online popularisation. *Ibérica: Journal of the European Association of Languages for Specific Purposes, 29*, 201–221.

Stöckl, H. (2014). Typography. In S. Norris & C. D. Maier (Eds.), *Interactions, images and texts. A reader in multimodality* (pp. 281–295). Walter de Gruyter.

Valeiras-Jurado, J. (2019). Modal coherence in specialised discourse: A case study of persuasive oral presentations in business and academia. *Ibérica: Revista de la Asociación Europea de Lenguas para Fines Específicos, 37*, 87–114.

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*.

Valeiras-Jurado, J., & Ruiz-Madrid, M. N. (2019). Multimodal enactment of characters in conference presentations. *Discourse Studies, 21*(5), 561–583.

Valeiras-Jurado, J., Ruiz-Madrid, N., & Jacobs, G. (2018). Revisiting persuasion in oral academic and professional genres: Towards a methodological framework for Multimodal Discourse Analysis of research dissemination talks. *Ibérica: Revista de la Asociación Europea de Lenguas para Fines Específicos, 35*, 93–118.

van Leeuwen, T. (2006). Towards a semiotics of typography. *Information Design Journal, 14*(2), 139–155.

Vicente-Sáez, R., & Martínez-Fuentes, C. (2018). Open science now: A systematic literature review for an integrated definition. *Journal of Business Research, 88*, 428–436.

Xia, S. A., & Hafner, C. A. (2021). Engaging the online audience in the digital era: A multimodal analysis of engagement strategies in TED talk videos. *Ibérica: Revista de la Asociación Europea de Lenguas para Fines Específicos, 42*, 33–58.

Zhang, Y., & O'Halloran, K. L. (2013). From popularization to marketization: The hypermodal nucleus in institutional science news. In E. Djonov & S. Zhao (Eds.), *Critical multimodal studies of popular discourse* (pp. 172–190). Routledge.