Recontextualizing knowledge in academic video publications

A discourse analysis of multimodal science dissemination

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Online videos have gained popularity as a means for academics to communicate complex scientific ideas both to specialist and non-specialist audiences (Erviti & Stengler 2016; León & Bourk 2018; Luzón & Pérez-Llantada 2019). Nonetheless, concerns are raised about the potential journalistic or oversimplified nature of such science communication efforts. Consequently, this paper aims to shed light on how researchers can enhance transparency without reducing the significance of the content. The study is accomplished through an analysis of a corpus consisting of 10 videos compiled from the 'Chemistry' section of the website *Latest Thinking* (lt.org). This study adopts a discourse analysis approach, focusing on the discursive strategies employed in these videos to recontextualize knowledge for a wide audience. The findings reveal three types of recontextualization strategies performed through the orchestration of various semiotic modes: simplification strategies, strategies to construct an authorial persona and bonding strategies.

Keywords: academic online video publications, science dissemination, discourse analysis, multimodal recontextualization strategies

1. Introduction

Scientific communication has moved from traditional media such as (academic) press and television towards online platforms. Driven largely by the affordances of the digital medium, such as multimodality, there has been a surge in diverse academic genres that enhance traditional formats and promote rapid, open knowledge dissemination (Cope and Kalantzis 2014; Gross and Harmon 2016). Online videos, in particular, have become increasingly popular among academics, univer-

sities, and other organizations as a means of making scientific knowledge accessible to a wider audience beyond the scientific community (Erviti & Stengler 2016; León & Bourk 2018; Luzón & Pérez-Llantada 2019).

In light of the emergence of novel ways for scientific dissemination, this investigation focuses on video publications (henceforth VP) hosted on website *Latest Thinking* (henceforth LT). LT (https://lt.org/) is a profit organization dedicated to providing open access to video summaries of research discoveries across diverse academic disciplines with the aim of facilitating a wider dissemination of scholarly findings. These publications, which have not been analysed in the existing literature, aim to enable research institutions and individual scientists to engage and persuade a diverse array of audiences, spanning from the extensive scientific community to policymakers and the general public with an interest in the subject matter.

LT video publications are presented as an innovative means of communication that meets the rigorous requirements of academic publishing while also appeals to a broader audience. As the LT organization claim in their website "[they] offer a well-curated range of products to empower you in your Science Communication skills and create accessible video formats that meet the academic standards while also being understandable for the interested public and entertaining to watch" (*Latest Thinking* 2023). Therefore, VP are presented as including precise and appealing content which integrates with publications in scientific journals. The video publications offered by *Latest Thinking* are regarded in this investigation as a notable breakthrough in the realm of scientific communication, introducing a fresh approach to dissemination that disrupts the traditional model of "scientist-mediator-audience." (Scotto di Carlo 2014: 596). These publications are meant to establish a connection between scientists and their viewers, making it more direct, engaging and accessible compared to the traditional, text-based dissemination through academic journals.

Aligned with this perspective, the present study aims to explore the way(s) researchers manage the information processing needs and the rhetorical expectations of both specialists and non-specialists and even a broader community when converting scientific knowledge into video publications to enhance their research visibility and effectively establish interpersonal connections with their audiences in these videos. In other words, this study analyses the recontextualization strategies used by researchers in 10 different VP of the field of Chemistry to navigate their position as experts, establish rapport with their audience and, at the same time, add transparency without reducing the content's meaningfulness. Therefore, this study is intended to answer the following research questions:

RQ1. How do researchers communicate their findings without trivializing the content or overwhelming the audience if they aim to address both the science community and the general public?
RQ2. What discourse strategies are used in these videos to recontextualize knowledge for a wide audience?

2. Literature review

The multimodal nature of online videos makes them an effective and accessible format for communicating complex scientific ideas to a less specialized audience. The process of making scientific information available to non-experts is referred to as 'popularization'. It can be defined as "a social process consisting of a large class of discursive-semiotic practices [. . .] aiming to communicate lay versions of scientific knowledge" (Calsamiglia & van Dijk 2004: 371). Traditionally, popularization has relied on a triangular communication that connects scientists, the audience, and text producers, such as journalists who are skilled at 'translating' scientific discourse into everyday language (Scotto di Carlo 2014: 592). Science popularization involves, therefore, a process of adapting or recontextualizing scientific knowledge to be understood by a lay audience.

In the context of online science videos, the scientific discourse of formal academic genres is 'recontextualized' taking advantage of the multimodal affordances of digital video. Recontextualization refers to "the process of moving meaning material from one context with its social organization of participants and its modal ensembles to another context with different social organization and modal ensembles" (Bezemer & Kress 2008: 184). The process of recontextualization entails the implementation of discursive strategies aimed at tailoring information to the cognitive abilities of prospective readers, as well as to stimulate their involvement with the subject matter being discussed (Gotti 2014; Luzón 2015). The level of (multimodal) intricacy, syntax, terminology, and accessibility of scientific information must be adjusted to suit a general audience. Researchers face the challenge of balancing competing priorities when disseminating state-of-the-art scientific research through various media platforms. They must ensure that the research remains understandable and engaging to readers without oversimplifying or misrepresenting the information. As Calsamiglia (2003: 140) puts it, researchers need to bridge the "gulf between the scientific world and the world of ordinary everyday experience". While researchers are faced with the task of establishing sensitivity to the audience's previous knowledge emphasizing their proximity, this does not mean reducing content's level and meaningfulness. This would potentially undermine the agency of academics in

engaging with discursive practices, both in terms of abstraction and use of formal register, that align with a specific discipline rather than others (Hu & Liu 2018). In the current research this fact is considered significant and meriting further investigation.

Hyland's (2010) concept of 'proximity' helps to understand how genres intended for different audiences represent scientific knowledge differently, since this concept "is concerned with how writers represent not only themselves and their readers, but also their material, in ways which are most likely to meet their readers' expectations" (p. 117). Recontextualizing scientific knowledge into online science-related video publications involves responding to the expectations of the new audience, considering the readers as individuals with certain knowledge and objectives. There are various ways to achieve proximity with the audience and, in this paper, the following five have been considered following Hyland's (2010: 121) classification:

- Framing, achieved by "tailoring information to the assumed knowledge base of potential readers, […] through language choices which ask readers to recognise something as familiar or accepted".
- The credibility of the source of information, i.e., authority is given to the research by underlining the status of informants.
- The author's stance, achieved by "removing doubts and upgrading the significance of claims to emphasize their uniqueness, rarity or originality".
- The way engagement is generated to achieve an alignment dimension of interaction where researchers acknowledge the presence of an audience, including them as discourse participants and guiding them to interpretations.
- The organization of visuals, which distinguishes popularization genres as it plays a key role giving visibility to information and offering a proof for interpretations to attract the reader and elucidate the text.

These facets are achieved through the use of certain rhetorical resources that are potentially different across genres and its communicative purposes. These include, among others, hedges, boosters, self-mentions and listener mentions, directives, questions, different levels of formality, references to shared knowledge (Hyland 2004, 2005; Biber 2006) and the organization of rhetorical moves and steps within genres (Swales 1990) influencing the perception and reception of their message.

Proximity can be achieved not only through language but also through other modes of communication, given that meaning is made by the strategic combination of written and spoken language, visual (still and moving image), audio, gestural and spatial modes and each mode has its own set of affordances and constraints (Kress 2010). It is, therefore, relevant for communicators to know what

is possible to express and represent or communicate easily with the resources of a mode (Jewitt 2014). The aforementioned resources are significant within academic discourse as they cannot only facilitate the communication of ideational meaning but also establish interpersonal connections between the author and the audience, thus shaping the author's voice and engaging the audience effectively. Additionally, these resources contribute fostering a sense of shared understanding and collaboration, enhancing the effectiveness and impact of their academic communication.

In this study, the principal multimodal combination comprises the verbal mode used by the researchers and still images appearing on the right-hand side of the screen. Consequently, this study also aims to know how the addition of images contributes to the knowledge building processes in these videos. Van Leeuwen's typology (2005) provides a nuanced approach to examining the inter- play between image and text. This approach can be effectively employed to implement the rhetorical principles that are currently taught to researchers for the purpose of integrating visuals into their broadcasted content. The structured categories established within Van Leeuwen's model (see Section 3.2) offer a well-suited methodology for examining the dynamic interactions between verbal and visual elements within this study's content, thus enabling to accomplish the objectives of the multimodal analysis. Studies such as those by Maier, Kampf and Kastberg (2007) and Engberg and Maier (2022) demonstrate that this methodology enables researchers to analyse the communicative impact of their multimodal data.

In exploring the integration of images within multimodal research outputs, it becomes evident that the effective use of videos not only complements but also enhances the dissemination and accessibility of complex information. The effective presentation and dissemination of new findings are critical in the emergence of various academic genres that complement and enhance traditional ones, while simultaneously facilitate the fast and open dissemination of knowledge (Edo-Marzá & Beltrán-Palanques 2023). Videos, in particular, are undoubtedly useful in conveying information that is difficult to communicate effectively through written text alone (Pasquali 2007). Thelwall et al. (2012) classified online science videos into six categories: scientific demonstration, public dissemination, education, talks to academics, information about scientists and comedy. The objectives of creating online videos and their production methods are evidently associated with the target audience. A large body of literature has investigated how videos allow researchers to make content more accessible and visible to particular audiences and cater for their information needs (e.g. Smith et al. 2017). In some cases, online videos are designed to function as instruments for communicating with colleagues, showcasing experimental details or demonstrating techniques (Thelwall et al. 2012), as it is the case of the *Journal of Visualized Experiments*

platform (JoVE, http://www.jove.com/). Several journals provide brief video summaries of their published papers, also defined as 'video abstracts' but drawing on several modes or semiotic resources (e.g. non-verbal sound, spoken and written language, image) to re-contextualize scientific discourse (Albero-Posac 2024). It is the case of some of the journals comprised in *The Lancet Group*, which attempt to have a positive impact on health informing clinical readers, including both practitioners and even patients, about new or best medical practices (https://www .thelancet.com/). They include genres that complement written content (in written genres) with authors' voices in their corresponding video abstracts to make the text more engaging for the audience (Edo-Marzá & Beltrán-Palanques 2023).

The relevance of the current paper lies on the analysis of video publications that are aimed at more than one type of audience, ranging from the broader scientific community to policymakers and the interested general public, to observe whether these videos are effective in making the information accessible for specialised and non-specialized viewers, and in bridging the gap between research dissemination and audience engagement.

3. Methodology

3.1 Video publications corpus

The data analysed in this study consists of video publications (VP) pertaining to the field of Chemistry published in the *Latest Thinking* website. This website's main motto is "we enhance the visibility of your research", i.e., it is designed to broaden the accessibility of academic journal content, ensuring that a wider audience can benefit from and engage with scholarly findings. The main research outputs published on the website are original videos categorised by disciplines, which have been previously curated by a selection committee and personally delivered by the authors through a video player designed to guide users through the scholars' brief explanations of their investigations. These videos are aimed at recontextualising one or several research articles authored by large research teams. Key features of the LT website are video DOI referencing, an embedded player and free hosting. Videos derive from peer-reviewed scholarly publications which are also accessible through the website together with the researchers' and the institution biodata. Currently the repository displays a collection of over 200 videos offering unrestricted access to users worldwide. Participating institutions and researchers are catered for with video production knowledge.

The VPs selected — published between 2016 and 2020—always have one researcher presenting. VPs have been explored considering both the video itself

and the verbatim transcription. In order to work systematically with a manageable corpus that would allow for a comprehensive examination of various semiotic resources, 10 videos have been selected for analysis. While a larger corpus may have provided more extensive data, I opted for a smaller sample size due to the nature of their analysis, which primarily involved a qualitative method. Table 1, in Appendix 1, provides an overview of the samples that compose the dataset. The VPs included in the corpus have an average duration of 10 minutes and their verbatim transcriptions have an average length of 2,013 words. These videos are structured into five parts (moves) in the shape of questions that help authors describe the data they are working on, their methods, the significance of their results, as well as the future prospects of their study:

– Chapter 1. What is your research question?
– Chapter 2. Which method did you employ?
– Chapter 3. What are your findings?
– Chapter 4. What is the relevance of your findings?
– Chapter 5. Your outlook for the future

The layout and organization of the 10 VPs analysed is not the same. From a longitudinal perspective the oldest videos analysed in the Chemistry area (videos 10, 9, 8 and 7 recorded in 2016) do not include images to elucidate the verbal speech of the researchers. It is already in video 6, published on the first half of 2017, when the video production includes still images. In the most contemporary videos (6, 5, 4, 3, 2 and 1) the screen is divided into two parts: the left-hand side of the screen shows the authors presenting, and the right-hand side of the screen displays the visuals of the presentation.

3.2 Analytical approach

This study takes a discourse analysis perspective focusing on how discursive strategies are used in these videos to recontextualize knowledge without trivialising it. The analysis starts from the information provided by the website *Latest Thinking* regarding its mission, which helps to understand the purpose of these videos. The website outlines three primary claims made by the website: "content is first", "directly from the researcher" and "impact is king". These claims provide the basis for developing the analytical framework of the study. As such, three different levels of discourse analysis were selected:

– Content, related to the claim on the website that "content is first".
– Researchers' self, related to the claim on the website that the videos come "directly from the researcher".

– Viewers engagement/impact, related to the claim on the website that "impact is king".

In order to analyse how recontextualization is achieved at each level the study draws on Luzón's (2019) classification of recontextualization strategies. Moreover, as already explained, in this analysis attention was devoted to different facets of proximity following Hylands's (2010) model. The focus of the study embraces the notion of 'interpersonality' (Hyland 2010) and how knowledge is negotiated with different audiences — both with field experts and a lay public. It engages with the concept of proximity as "it not only includes how writers manage themselves and their interactions with others, but also the ways ideational material, what the text is 'about', is presented for a particular audience" (Hyland 2010: 117). As a result, three different categories of strategies have been differentiated: 'simplification strategies', 'strategies to construct an authorial persona' and 'bonding strategies'. They include distinct multimodal recontextualization strategies that serve specific functions at each of the three analytical levels to achieve various facets of proximity.

The first level of analysis — 'content'– is aligned with the 'simplification strategies' category. The strategies included in this category are aimed to tailor or simplify information to match the assumed knowledge level of potential viewers. They are used to simplify complex concepts and make information accessible. These strategies are used in order to fulfil the 'framing' proximity facet, in which specific language choices and explanations are required. The second level of analysis — 'researchers' self '– is aligned with the 'strategies to construct an authorial persona' category. These strategies are used to build the researcher's credibility and authority and, therefore, this category of strategies is intrinsically related to the 'credibility' and 'stance' proximity facets, which give information about the writer's attitude to the communicated ideas and to their readers. The third level of analysis, — 'viewers engagement/impact'– is aligned with the 'bonding strategies' category of strategies, since they are designed to bond with viewers and guide them towards a shared perception of relevance. This last category of strategies is related to the fulfillment of the 'engagement' facet of proximity.

As these strategies can be performed through the orchestration of various semiotic modes (Kress and Van Leeuwen 2006), the video publications were subjected to analysis based on their visual representations and content. Due to the impossibility of analysing all the semiotic resources in the 10 video publications in the corpus (see Paltridge 2012), I decided to focus on the following modes: oral speech, written language and static images. The data for this study were analysed using Atlas.ti, a qualitative data analysis tool which allows annotation and coding of texts, audio and video documents. Table 3 presents the list of discursive strategies that were systematically coded (see Section 4).

In order to elucidate the interplay between verbal and visual modes within the single medium of these videos for the purpose of conveying scientific knowledge to the website's target audience, Van Leeuwen's (2005) multimodal model of image-text relations was employed. It is based on a set of descriptions for different types of visuals correlated with 'meaning potential' based on functions derived from the interaction of the text and visuals. The categories include functional labels to explain the following specific relationships (see Table 2):

Table 2. Van Leeuwen's classification of relations between visual and verbal modes

Relations	**Types**	**Subtypes**
Image-text	Elaboration	Specification — the image makes the text more specific or the text makes the image more specific
		Explanation — the text paraphrases the image or vice versa
	Extension:	Similarity — the content of the text is similar to that of the image
		Contrast — the content of the text contrasts with that of the image
		Complement — the content of the image adds further information to that of the text and vice versa

The current study used this classification to establish the relationship that images and verbal speech maintain at the level of "ideational enhancement" (Engberg & Maier 2022: 18) of the domain-specific knowledge. Therefore, transcribed verbal discourse has been analysed in connection with the still images that appear simultaneously on screen during the videos. This can be considered a multimodal discourse strategy which aligns with the fulfilment of the "organization" proximity facet (Hyland 2010). This facet considers visuals as a relevant means to give visibility to information.

It is important to note that this study adopts a primarily qualitative approach, aiming to illustrate the interplay of various modes in sharing research within online videos. Nevertheless, certain quantitative data is included to facilitate the understanding of the relationship between the utilization of these resources and the communicative purpose of the genre. This framework also highlights a multifaceted approach to academic communication, combining verbal and visual elements to engage diverse audiences effectively.

4. Results and discussion

Table 3 outlines the results obtained in the study using the previously mentioned framework for analysing how the video publications hosted on the *Latest Thinking* website use multimodal strategies to recontextualize academic content and communicate it effectively. It highlights three key claims made by the website— "Content is first," "Directly from the researcher," and "Impact is king"— and includes the three different categories of recontextualization strategies, the resources through which these strategies are realized and the functions associated with each of them.

The majority of the strategies coded (43%) fulfil functions aimed at tailoring or simplifying information to the assumed knowledge of potential viewers. Therefore, we can observe that content is prioritized and, as such, time and effort are devoted to explaining or clarifying concepts and processes that may be unfamiliar for viewers. The narrative is organized focusing on an overview of their research activity and main findings, rather than on the research process. To a lesser extent (35%) strategies are also used to construct the researchers' credibility and authority or, as Dontcheva-Navratilova puts it, "to construct and authorial persona" (2023: 221). Finally, 22% of the strategies coded were aimed at recognizing the presence of non-specialized viewers and bonding and connecting with them by means of using persuasive arguments (Luzón 2019). However, in these videos researchers do not only aim at attracting the lay audience and arise public interest in their research activity and their discipline but also to engage with the peers in the science community. Both communicative aims may, therefore, not be equally achieved.

The analysed videos integrate verbal chronological narration with accompanying images, aiding viewers in visualizing the various stages of the narrative. They present variation regarding audiovisual material, ranging from a sequential display of images along with superimposed text on the right hand of the screen, whereas scientists themselves appear on the left part of the screen usually sitting down. All these popularization videos share the same illustration procedures based on metaphors and 'concretizations' (Gotti 2014) which help explain what is assumed by the researchers as complex facts for their broad audience. These visual elements also serve to attract and maintain the viewers' attention, directing their focus towards the object of research being presented and elucidate the text (Miller 1998). This is a "professionally generated content" and institution-driven as opposed to "amateur user-generated content" (Kim 2012), given that video production knowledge is provided to participating institutions and researchers to communicate and facilitate such knowledge in these particular videos.

Table 3. Results overview

Website's claims	**Multimodal recontextualization strategies**	**Functions of the strategies**	**Facets of proximity**	**Recurrent patterns of strategies' manifestation**
"Content is first"	Simplification strategies	To tailor or simplify information to the assumed knowledge of potential viewers	Framing	Non-specialised terminology
				Definition/ non-technical explanation of disciplinary procedures and methods
				Simile
				Description of an object
				Reformulation
				Exemplification
			Organization: The role of visuals	Visual extension of researcher's verbal discourse through still images
"Directly from the researcher"	Strategies to construct an authorial persona	To construct the researchers' credibility and authority	Credibility and Stance	Evaluative language to express a gap/problem/ challenge
				Linguistic expression of ability
				Present facts as community endorsed common sense
				Positive verbal evaluation of their research
				Hedges to express researcher's plausible reasoning rather than certain knowledge
				Use of personal pronouns (exclusive "we", "I")
			Organization: The role of visuals	Visual extension of researcher's verbal discourse through still images

Table 3. *(continued)*

Website's claims	Multimodal recontextualization strategies	Functions of the strategies	Facets of proximity	Recurrent patterns of strategies' manifestation
"Impact is king"	Bonding strategies	To bond with the viewers and guide them towards a common perceived relevance	Engagement	Inclusive "we"
				Reference to viewers ("you, your")
				Rhetorical questions
				Verbal expression of feelings or emotional reactions
				Statement of a social problem or challenge to solve
				Listing of uses and applications
			Organization: The role of visuals	Visual extension of researcher's verbal discourse through still images

The analysis of the combination of the verbal and visual modes shows that the links between the right-hand side appearing images have not only a "cumulative but also a cognitive value" (Van Leeuwen 2005: 220), as they make items of information meaningful in relation to each other. It also demonstrates that the meaning of the words produced in the verbal speech by the researchers in the VP is similar to the content of the images and, therefore, the multimodal relations are represented by relations of ideational concurrence through the process of "extension". Most precisely, meaning is conveyed at the logical level of "similarity", at the temporal level of "simultaneous event" and at the spatial level of "co-presence" with the verbal discourse. This process implies images 'anchoring' and 'elucidating' words given their linearity (Van Leeuwen 2005: 229).

In what follows the three categories of recontextualization strategies are explained in terms of recurrent patterns and manifestations.

4.1 Simplification strategies

Popularizations, as it is the case of the videos compiled and analysed on the LT website, do not assume a high level of shared knowledge. As such, they need to establish connections with what readers are already likely to be familiar with.

Consequently, they consistently introduce and define new concepts while explicitly provide exemplifications. By offering concise definitions and explanations that relate intricate processes to familiar occurrences, the unfamiliar becomes comprehensible. This approach considers the viewer's perspective and presents specialised concepts in terms of the ordinary and commonplace for a better understanding of the subject matter. This has to do with the way authors 'frame' information for their target readers (Hyland 2010).

It is the case in Example (1), in which the researcher is establishing connections between his/her study on artificial intelligence and language translation processes since in both areas 'deep learning' studies are intrinsic. Therefore, in this case, information is correlated or compared with research in Humanities, recognizing, in turn, the presence of Humanities researchers or practitioners as possible viewers in an attempt to make connections to what they are likely to already know. This pragmatic attitude in which certain interrelations between interdisciplinary researchers are established is achieved through a strategic use of the linguistic resources such as a 'simile' with the aim of establishing affinity and solidarity (Luzón 2019).

(1) **Simile with research in Humanities and use of static images.**
Another example that relates to dynamic processes and time series is (.) what is also well known (.) is deep learning. It is used for language translation, where the meaning of a word depends on a lot on what has been said before. This is again similar with dynamics on the Earth, where the current activities on Earth also depend a lot on the history (VP 1).

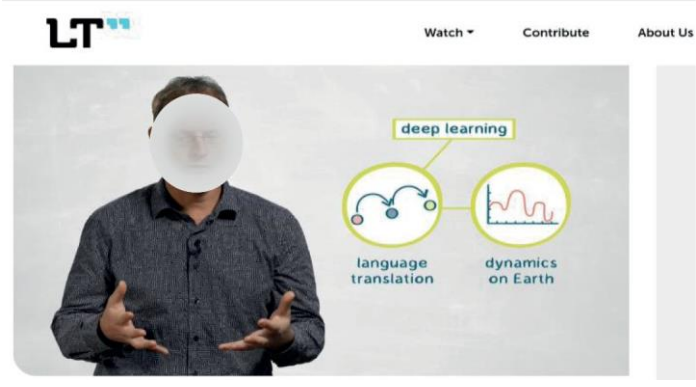

Figure 1. Visual extension of researcher's verbal discourse through still images in VP 1

As previously explained, in this example the relation between "deep learning" processes as being used both for language translation and dynamics on Earth studies is enhanced by the image on the left-hand side in order to 'extend' (Van

Leeuwen 2005) the verbal mode and ensure the relation viewers maintain with such content, i.e., the visuals complement the verbal explanations showing logical relations (such as in "similar with") but they do not add new information.

The recourse to 'concretization' (Gotti 2014), formerly used as an umbrella term, has materialized in this corpus through discursive strategies such as comparisons with everyday reality in order to facilitate comprehension of abstract information and distant situations. As can be observed in Example (2), the potentially unfamiliar content in relation to 'brain aesthetic experiences' becomes intelligible through the use of concise definitions and explanations that establish connections between complex processes and everyday events. In this excerpt a 'simile' is used as an exemplification resource that relates a rather complex idea ('aesthetic experiences') to the familiar ordinary event of going to a museum. The researcher in this case also avoids jargon and offers an immediate gloss ("that performance is touching or moves you") supported by the corresponding visual extension of what the researcher is saying.

(2) **Definition/ non-technical explanation of disciplinary procedures and use of simile.**
The big question that we're interested in is how the brain supports aesthetic experiences. For example, when you go to a museum and you find a painting to be beautiful or when you go to a performance and that performance is touching or moves you, we want to know what brain processes and representations support those unique aesthetic moments (VP 3).

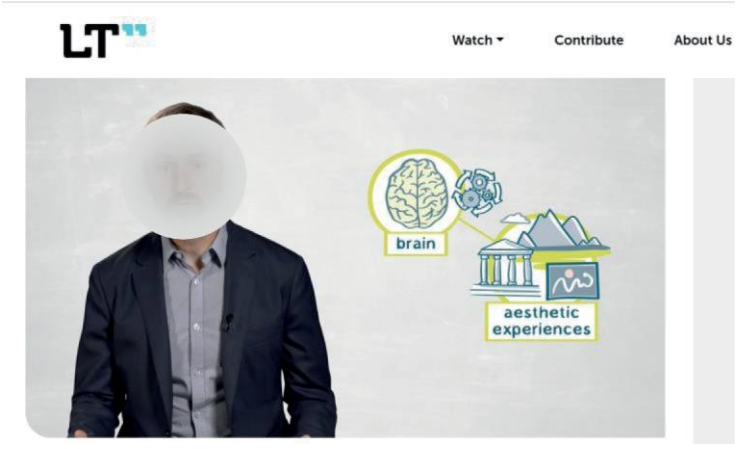

Figure 2. Visual extension of researcher's verbal discourse through still images in VP 3

In relation to the visual extension for the ideas conveyed in this transcribed excerpt, Figure 2 fulfils the same ideational enhancement process that in the

previous example: materializing and confirming the connection between 'brain functioning' and 'aesthetic experiences' resulting from common activities such as going to a museum (illustrated by the symbolic image of an antique building). While the verbal discourse offers the exemplification, the images (inserted into circles to identify them as different entities) are simultaneously connected by means of a line (an arrow) indicating the relations that the researcher wants to emphasise. However, given the simplification mechanisms used both verbally and visually, the researcher seems to be approaching a rather non-specialized public than a professional one, considering the former may not require the same framing strategies as the latter with a higher degree of specialised expertise.

4.2 Strategies to construct an authorial persona

In these videos researchers' stance and credibility become apparent as they actively express their role as experts and highlight the significance and complexity of their research. Researchers tend to present their investigation as a result of a gap/problem/challenge to solve. It is the case in Excerpt 3, in which it is especially noticeable how the researchers make the innovation asset of their research explicit ("I think that this is really the surprising part of our finding"). The assertion of novelty often relies on a positive evaluation of the solution to a problem, indicating the researcher's familiarity with disciplinary procedures and methodologies employed to address it. By showcasing their expertise in navigating the field's procedures and effectively solving problems researchers construct and strengthen their identity as experts and their credibility. This process also involves emphasizing the unique contributions of their work, demonstrating their knowledge and skills within their respective disciplines. It is also illustrated in Example (3), in which the researcher verbally emphasizes their ability to "train a machine" and "predict responses" through the use of modality expressions (e.g., using the verb "can").

(3) **Linguistic expression of ability and positive verbal evaluation of their research.**

> So, we can train a machine learning classifier on trials where a person was looking at artwork, and we can actually predict their responses on trials where they're looking at landscapes. I think that this is really the surprising part of our finding, this brain network that is really thought to be involved in inwardly directed contemplation (VP 3).

The use of evaluative language such as "surprising" or boosters such as "actually" are part of the process of "removing doubts and upgrading the significance of claims to emphasize their uniqueness, rarity or originality" (Hyland 2010: 124) — in Luzón's (2019) study "appealing to novelty or newsworthiness". The use

of exclusive "we" also helps to distance the researcher from the potential lay or non-specialised audience, as it performs the discourse function of granting the researcher the position of "recounter of the research process" (Tang & John 1999: 28) while highlighting the contribution to knowledge making. The use of exclusive "we" can also be considered as the dominant form of self-mention in hard sciences written published research (Dontcheva-Navratilova 2023). Therefore, the researcher's construction of authority using this type of disciplinary conventions helps to achieve 'proximity of the membership' to the discipline (Hyland 2010: 117). Through these strategic choices, these popular science videos aim to engage readers by highlighting the groundbreaking nature of the research, boosting the overall impact of their narrative and constructing the researchers' credibility and authority in the field.

As opposed to this discursive pragmatic attitude, the analysis has also revealed how researchers in the videos also used hedges such as saying that their research is not the "Holy Grail", which reduces the importance and newsworthiness of the research being presented by drawing attention to its uncertain true value (see Example (4). In other words, the researcher makes use of hedges to express his/her plausible reasoning rather than certain knowledge. Expressions such as "I don't know about it" or assertions concerning the methods such as "they can also produce results which are hard to explain because these methods are also usually black box methods" are used to "[subordinate] their own voice to that of nature" (Hyland 2010: 123), and so increase the objectivity and persuasiveness of the argument, as well as to align the viewer with the speaker in the task of understanding and solving the stated challenge/problem/gap. According to Dontcheva-Navratilova (2023: 221) this pragmatic attitude is intended to indicate 'proximity of commitment' expressed through adopting a personal stance regarding the relevant issues at hand and the audience (Hyland 2010: 117). This means that the researcher in this example aims at representing him/herself as a friendly modest expert willing to share their knowledge with the non-specialized audience but also with the discipline-specific peers seeking for common knowledge construction.

(4) **Evaluative language to express gap/problem/challenge.**
But at the same time, we are totally aware that this is not the Holy Grail and why is it not the Holy Grail? Because these methods, as all statistical methods, don't naturally obey the physical laws. I don't know about it. So, they can produce physically totally implausible results, and they can also produce results which are hard to explain because these methods are also usually black box methods. And so it's a big challenge to understand why deep learning methods actually do certain predictions and not others (VP 1).

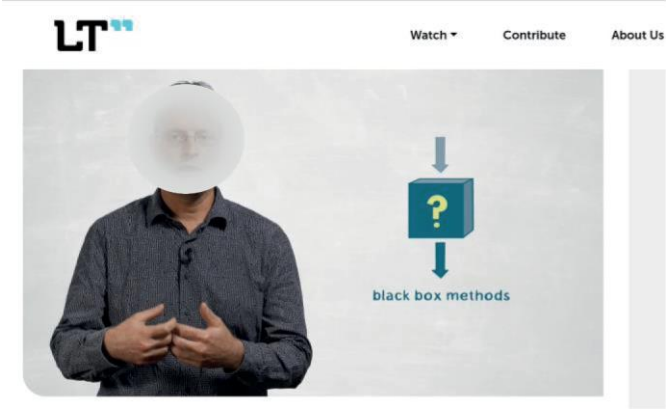

Figure 3. Visual extension of researcher's verbal discourse through still images in VP 1

However, the simplified level of content and its meaningfulness discussed concerning the methods and procedures, both through the verbal and the visual modes (see Figure 3 where a simplified image of a box with a question mark is depicted), may compromise the discourse proximity with academics and professional audiences as they do not engage with rhetorical practices of their respective fields — that would require a higher degree of abstraction foregrounding procedures (both in the verbal and visual modes) and the utilization of formal regis- ters (using technical jargon, nominalisations, acronyms, etc.) which serve to align with a particular discipline as opposed to others.

4.3 Bonding strategies

The significance of scientific knowledge is now being recognized not only in terms of advancing disciplinary knowledge but also in their substantial relevance to public interests (Bondi, Cacchiani & Mazzi 2015). As a result, the third type of strategies used in the LT videos analysed are those by which researchers explicitly address the audience to guide them towards a common perceived relevance of the scientific advances they are sharing in these popularization videos. In fact, the capacity to demonstrate immediate applicability of research topics to real-life concerns is one of the aspects that potentially generates engagement in the audience. Engagement, as defined by Hyland (2005), entails recognizing the viewers' presence, drawing them into the argument, capturing their attention, addressing their uncertainties and guiding them towards interpretations.

In the Example (5), inclusive pronouns such as "we" and "our" are used by the speaker to acknowledge the viewer's presence. They serve the function of identifying the viewer as someone who shares a point of view with the researcher. It

sends a clear signal of membership by textually constructing both the researcher and the viewer as participants with similar understanding and goals. Secondly, the researcher in this video also tries to make his/her research valuable for the audience, drawing on the "novelty" appeal, i.e., presenting the research as a new contribution to existing disciplinary knowledge (Hyland 2010) and the "applications" appeal, i.e., presenting the research as having further benefits or future applications (Fahnestock 1986). In the case of this video the 'applications' and the 'novelty' appeals are verbalized as "potential health outcomes and "relevance for this work", showcasing the researcher's positive evaluation of the investigation promoted in the video. Furthermore, the inclusion of the voices and perspectives of those engaged in scientific endeavours brings the subject matter to life, even introducing personal experiences — in this example by means of inclusive pronouns such as "our lives". This approach not only enhances understanding but also creates a sense of connection and relevance, making science more relatable and engaging to the general public.

(5) **Use of inclusive "we" and listing of uses and applications.**
The amount of money and time that we spend on aesthetic pursuits makes it clear that going to an art museum or looking at a landscape is not purely a pastime, but it's really an important key component of our lives. And so I think that there could also be some potential health outcomes and relevance for this work (VP 3).

By combining conversational qualities and personal voices, popularizations bridge the gap between the technicality of science and the curiosity of the wider audience, thus managing proximity. Thus, a final way used by researchers to build a connection with viewers is through the use of rhetorical questions. They play a significant role in creating a sense of immediacy and proximity between the researcher and the audience, serving as a valuable means of managing the lat- ter's involvement. In Example (6), the concept of 'CO2 in the atmosphere' is fur- ther explained by relating it to what may be relevant for the audience as in "so why should we care about that?". This question serves to state a social problem or challenge to solve and helps guide viewers towards a perceived relevance of the reported research, aligning the researcher with the audience in the need for investigation.

(6) **Use of rhetorical questions, inclusive "we" and statement of a social problem or challenge to solve.**
My basic research question is how long does it take the carbon that gets fixed from atmospheric CO2 by plants? How long does it take that carbon to travel through the plant soil system until it ends up back in the atmosphere as CO2? So why should we care about that? (VP 2).

The conclusion that can be drawn from the current analysis is that, instead of simply "explaining" scientific concepts, this emerging form of popularization uses verbal and non-verbal resources to elucidate the societal significance of these phenomena, thereby generating interdiscursive texts that interweave informative and explanatory discourse with broader issues of public interest (Gotti 2014: 27). This reinforces the crucial role of rhetorical emphasis on the content being presented, incorporating elements of immediacy, emotional appeal, shared objectives, and societal support (Bondi et al. 2015; Gotti 2014).

5. Conclusions

The results of the study reveal that the videos' focus is on explaining complex scientific ideas which are important to understand their investigations and the relevance of their findings — avoiding delving deeply on the procedures they use to obtain them. This content is tailored or simplified for the assumed knowledge of potential viewers, including a specialised and non-specialised public, alluding to the audience's previous shared knowledge. Secondly, visual and verbal resources are combined to ensure that the content presented is not only comprehensible but also engaging for the audience under an "extension" relation, most precisely at the logical level of "similarity" mostly depicting relationships between concepts. Pragmatic and linguistic resources help to establish affinity and solidarity and to recognize the presence of the viewers and connect with them. To a lesser extent, certain strategies are also used to promote a particular researcher's investigation and to demonstrate their expertise and knowledge of disciplinary scientific practices. The VPs establish the relevance of the studies by presenting them as result of the researchers' effort to solve a socially relevant challenge.

While the study highlights the utilization of various modes to leverage the potential of the genre in effectively conveying information in the most contemporary videos, the analysis of the interplay between verbal-pragmatic and visual resources has helped to redefine the communicative purpose of the genre: to make research accessible mostly for non-specialized audiences and so increase scientific outreach. This means that both the verbal and the visual proximity strategies used in these videos demonstrate that, in fact, these VPs target an interdisciplinary audience interested in the topic than a disciplinary-related professional aiming to acquire new insights and advancements on their likely shared research areas. Therefore, the analysis of these videos has demonstrated that researchers in these videos use a popularization discourse that makes their rhetorical style closer to the 'limited' knowledge of a lay audience. Other types of strategies would be still required to address and engage with the latter public, such

as meeting their procedural and methodological demands to some extent and considering including certain reference to previous peer work in other to align with the scientific community. Using different multimodal specification strategies (e.g., image-text linking strategies) would also be useful in order to satisfy both a specialized a non-specialized audience in their information-processing needs.

These results offer valuable insights into strategies for recontextualizing scientific discourse, which can be useful for researchers aiming to engage the general public and promote interest in their research through this website or similar online videos. The findings also suggest several pedagogical implications, especially for ESP and EMI studies. The strategies analyzed in this paper can be considered by educators to train students to articulate their perspectives clearly and convey their messages effectively to a multifaceted audience. This process would also require boosting the science communicators' awareness of the stance they project and the engagement they foster in compliance with their target audience(s) as a way to bridge the potentially existent knowledge asymmetries (Lorés 2023).

This study acknowledges certain limitations that should be taken into consideration. Firstly, the results of this study should not be generalised, as it has examined qualitatively a small corpus of video abstracts in a single discipline (among the many disciplines offered in the LT website). It would also be desirable to include a larger number of videos of different disciplines in order to expand the dataset and obtain more representative results. However, it could be difficult to "confine" the results of fine-grained multimodal analyses of more videos in the limited space of such a paper. Additionally, the scope of the multimodal analysis could be enhanced by delving deeper into researchers embodied meaning- making potentials. The current study primarily focuses on visual and linguistic elements as the primary factors shaping the authors' voice. However, by extending the multimodal analysis to include a complete examination of researchers' embodied actions, a more comprehensive understanding of the construction of meaning can be achieved. Finally, the textual analysis carried out in this study would greatly benefit from the insights coming from an extensive exploration of the contextual digital nature of the website where the videos are embedded as well as the analysis of the journal articles from which information has been recontextualized.

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http://genci.unizar.es/ @digital_genres

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Appendix 1. Corpus of video publications analysed (with DOIs)

Table 1. Overview of the VPs that compose the corpus

	Reference	Length	Verbatim transcription (No. of words)
Video 1	Markus Reichstein How Can Artificial Intelligence Enhance Our Understanding of the Earth System? **LT Video Publication DOI:** https://doi.org/10.21036/LTPUB10819	0:07:44	1,048
Video 2	Susan Trumbore What Happens to Carbon Dioxide in Plant and Soil Systems? **LT Video Publication DOI:** https://doi.org/10.21036/LTPUB10795	0:07:40	1,101
Video 3	Edward A. Vessel How Do Aesthetic Experiences Function in the Brain? **LT Video Publication DOI:** https://doi.org/10.21036/LTPUB10774	0:09:26	1,556
Video 4	Largus T. Angenent How Can Waste Be Converted Into a Source of Carbon for the Production of Chemicals? **LT Video Publication DOI**: https://doi.org/10.21036/LTPUB10609	0:11:46	1,081
Video 5	Meredith Schuman Why and How Do Plants Emit Volatile Compounds When Defending Themselves Against Herbivores? **LT Video Publication DOI:** https://doi.org/10.21036/LTPUB10579	0:10:21	882
Video 6	Jos Lelieveld What are the Sources and Health Effects of Air Pollution **LT Video Publication DOI:** https://doi.org/10.21036/LTPUB10393	0:13:29	1,135

	Reference	Length	Verbatim transcription (No. of words)
Video 7	Martin Heimann What Is the Role of the Eurasian Forests Under a Warming Climate **LT Video Publication DOI:** https://doi.org/10.21036/LTPUB10213	0:11:14	987
Video 8	Jonathan Gershenzon Which Chemical Traits Protect the Roots of Dandelions Against Insect Damage **LT Video Publication DOI:** https://doi.org/10.21036/LTPUB10219	0:11:10	1,046
Video 9	Oliver Bünermann How Can We Experimentally Determine Why Hydrogen Atoms Are Absorbed on Met **LT Video Publication DOI:** https://doi.org/10.21036/LTPUB10186	0:11:27	1,110
Video 10	Julio Saez-Rodriguez How Can the Toxic Effects of Chemical Compounds on Humans Be Predicted by Means of Crowdsourcing **LT Video Publication DOI:** https://doi.org/10.21036/LTPUB10186	0:08:10	1,127
	Totals	**1:42:27**	**11,073**
	Average length	**0:10:15**	**2,013**

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