

Using questions in non-interactive presentations: multimodal analysis of an audience-engaging strategy

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Abstract

Open science, an approach based on making research available and understandable to everyone, is currently attracting considerable attention. Online genres are a well-accepted means of democratizing science and spreading scientific research to reach the widest audience (Luzón & Pérez-Llantada, 2019). This paper explores one of these genres devoted to laypeople: FameLab presentations. These are online 3-minute talks on scientific and/or technological subjects which are part of an international competition. One aim of these talks is to engage the audience, and this strategy can be developed by both different language resources (Hyland & Zou, 2021), and multimodal ones (Fortanet-Gómez & Ruiz-Madrid, 2016; Luzón, 2019).

Our study focuses on analyzing how questions are used as an engagement device to attract the audience's attention, and how they are complemented by multimodal features. Our dataset includes 20 FameLab presentations from the 2020 (10) and 2021 (10) editions, when they became live-streamed, pre-recorded events because of the COVID-19 pandemic, unlike the traditional dynamics, when they were delivered as in-person live events. Following prior research (e.g., Thompson, 1998), we identified the questions appearing in our dataset, and found similar results to previous findings in comparable genres. We then conducted a multimodal analysis to determine common features among speakers. The results show the need to consider certain non-verbal features which accompany questions, supporting and emphasizing their engagement function. Our research may help understand how multimodal discursive practices are used to explain science, and how they can be transferred to the classroom of Languages for Specific Purposes.

Keywords: 3-minute talk, multimodality, audience engagement, open science, science communication

Resumen

El uso de preguntas en presentaciones no interactivas: Análisis multimodal de una estrategia para implicar a la audiencia

La ciencia abierta, un enfoque que permite que la investigación esté disponible y sea comprensible para todos, está atrayendo gran atención. Los géneros digitales son ampliamente aceptados como medios para democratizar la ciencia y difundir su investigación (Luzón & Pérez-Llantada, 2019). Este artículo analiza uno de esos géneros dedicados al público lego: las presentaciones del concurso FameLab. Son charlas virtuales de 3 minutos sobre temas científicos y/o tecnológicos que forman parte de una competición internacional. Uno de sus objetivos es involucrar a la audiencia, y esta estrategia puede desarrollarse a través de diferentes recursos lingüísticos (Hyland & Zou, 2021) y multimodales (Fortanet-Gómez & Ruiz-Madrid, 2016; Luzón, 2019).

Nuestro estudio analiza cómo las preguntas se utilizan como recurso para implicar al espectador, atrayendo su atención, y cómo se complementan con características multimodales. Nuestros datos incluyen 20 presentaciones de las ediciones de 2020 (10) y 2021 (10) cuando, por la pandemia, FameLab se convirtió en un evento pregrabado, opuesto a la presencialidad, que había sido la dinámica tradicional. Siguiendo investigaciones previas (por ejemplo, Thompson, 1998), hemos identificado las preguntas que aparecen en nuestros datos, observando que los resultados son similares a estudios de géneros comparables. Posteriormente, se ha realizado un análisis multimodal para comprobar las particularidades comunes entre los oradores. Los resultados muestran la necesidad de considerar algunas características no verbales que acompañan a las preguntas, apoyando y enfatizando su función para implicar a los espectadores. Nuestro estudio puede ayudar a comprender cómo las prácticas discursivas multimodales se usan para explicar la ciencia y cómo pueden trasladarse al aula de lenguas para fines específicos.

Palabras clave: presentaciones de 3 minutos, multimodalidad, implicación de la audiencia, ciencia abierta, comunicación científica

1. Introduction

Open science can be defined as “transparent and accessible knowledge that is shared and developed through collaborative networks” (Vicente-Sáez & Martínez-Fuentes, 2018, p. 434), which according to Pérez-Llantada (2021), is a radical new way to do research, share knowledge and disseminate it. This dissemination of science has been achieved by the use of technology and by digitizing traditional genres or using the affordances of social media; in other

words, by using diverse “multimodal genres and media such as podcasts/videocasts, blogs, webinars, citizen science and crowdfunding projects, YouTube videos and TED Talks” (Pérez-Llantada, 2021, p. 66). Those online genres are widely accepted tools for democratizing or popularizing science and spreading scientific research to everyone, implying a new (and friendly) link between society and science (Luzón & Pérez-Llantada, 2019; Rowley-Jolivet & Carter-Thomas, 2019; Engberg, 2023). They may contribute to engaging the public in science and making it more accessible to laypeople outside academia, who are also increasingly interested in it (Poliakoff & Webb, 2007; Powell & Colin, 2008; Zuccala, 2009; Laslo et al., 2011). As Xia and Hafner (2021) point out:

Advances in digital technologies give rise to a second method of scientific popularization. In this method, scientists communicate directly with the lay audience, an approach that is facilitated by an increasing number of digital platforms where scientists can share their knowledge with wide audiences. On these platforms, scientist popularizers can make use of multiple semiotic resources such as images, moving images, audio and video to illustrate their points. Compared to traditional print media, the multimodal resources afforded by digital media can provide visualizations of abstract scientific concepts that enhance scientists’ ability to explicate scientific concepts in less technical language. (p. 35)

This article therefore focuses on one of those current genres developed to share science with everyone (FameLab) as an example of a multimodal genre that involves several resources to make the content more attractive for the audience. Our aim is to analyze the use of questions in association with non-verbal features as an engagement device in an attempt to attract the audience’s attention from the standpoint of multimodal discourse analysis.

The sections herein are as follows. First, the FameLab event is contextualized and explained. This is followed by a section on the use of rhetorical questions as an engagement strategy, and how they have been studied from a multimodal view. In section 3 we explain the methodology followed for the multimodal analysis. Sections 4 and 5 present the results and discussion regarding the use, function and position of the questions, as well as how verbal and non-verbal features combine to reach their engaging aim. Conclusions and pedagogical implications come at the end.

2. Informing and entertaining: the case of the FameLab 3-minute event

The emerging forms of science communication aim at achieving several goals: informing, educating and entertaining the audience (Mauranen, 2013; Pérez-Llantada, 2021; Engberg, 2023, among others). However, this variety of objectives has evolved into several concepts which may be seen as more or less positive regarding the effect of the forms of communication selected or the audience's involvement in the transmission of knowledge: "Vulgarization", "Scifotainment", "Infotainment" or "Edutainment" (Zhang, 2019). Engberg (2023) makes a thoughtful contribution by proposing a continuum of knowledge communication from infotainment to citizen science, by way of dissemination, popularization and pedagogic communication. This continuum is based on the degree of participation in science and the personal and emotional bonds that may be created between the participants.

Engberg (2023) states that 'citizen science' is the best option for people's involvement in science, and 'infotainment' requires the least degree of involvement by the general public in the sense of not participating in the scientific work. However, we also share his view that infotainment can lead laypeople to increase their interest in science and move to a more participatory position, which could be included in the knowledge popularization. Apart from the TED talks format (Xia, 2023), where scientists often deliver speeches to a non-specialist audience, there are many new genres that attempt to present science in a simple and entertaining way, even using humor as the main part of the event, such as the Big Van Ciencia sessions (González Burón & Marimón Garrido, 2020, 2023) and similar structures (as compiled by Weitze et al., 2023). In our case, we will focus on the FameLab competition as an example of infotainment.

The FameLab international scientific talks competition is an event organized worldwide by the British Council. It was founded by the Cheltenham Science Festival (UK) in 2005, although several countries have supported it through other national organizations. The international event requires young scientists to deliver a 3-minute talk in English, summarizing their research on STEM subjects (mainly scientific and/or technological ones). The main goal of FameLab is "to identify, mentor, and link young talented science communicators. [...] [The developers] had a longstanding commitment to finding ways in which scientists [...] could enter the public domain"

(Zarkadakis, 2010, pp. 281–282). Additionally, after the presentations, each competitor takes part in a Q&A debate with members of the evaluating committee.

The format of the competition follows the parameters of some well-known TV talent shows (“Got Talent”, “American Idol”) where entertainment becomes a vital element of the show as it has to be “a pleasant and exciting show that presents concepts and ideas from science in a delightful way, by new ‘faces’ of science that upturn the usual stereotypes” (Zarkadakis, 2010, p. 282). This confirms Engberg’s (2023) idea that the main purpose of infotainment is entertainment, and a possible secondary purpose is to make the audience learn about new things.

Based on this format, the traditional setting was a stage, with competitor(s), a jury (from academia and the media), and a live audience. However, this setting changed in 2020 and 2021 (our dataset), as finalists could not share a stage due to the COVID-19 pandemic. As a result, the format of the show changed radically: the participants were video-recorded at home in their own countries, and the entire dynamics of the sessions were based on those pre-recorded presentations, which were followed by a live online debate with the members of the evaluating panel.

Although the closest reference to our interest is the research done on 3-minute thesis (3MT) presentations, we agree with Hu and Liu (2018) when they point out that this genre and our dataset are not the same because “rules regarding the use of slides and props separate it [3MT] from other similar academic research communication genres (e.g., conference presentations, TED talks) and other science communication competitions (e.g., FameLab)” (p. 21). In fact, FameLab participants can only use props to help them convey their message, and provided that they can carry these props on stage and set them up very quickly. There are also important differences with other similar competitions, such as the fields of scope (FameLab is only focused on the STEM areas), and even the audience, which is meant to consist mainly of laypeople.

Furthermore, the online format of FameLab is an example of digital oratory, following Rossette-Crake’s (2022) criteria. FameLab presentations are monologic, use multimodal resources, and the speaker is visible all the time. As a contest, they have a public dimension since they are broadcast on YouTube. The distinguishing feature of these presentations is that they deal with serious research, albeit in an entertaining manner. Finally, these

presentations are part of the same contest, broadcast on the same platform, under the same conditions and to the same audience.

As a competition, the panel of judges is required to base their decision regarding the winner on three criteria (known as the 3 Cs) explained on the website (<https://www.cheltenhamfestivals.com/science-/famelab/rules/>): content, clarity and charisma. Content means to be scientifically accurate and suitable for the audience. Clarity is concerned with the importance of the structure of the talk, and whether it is easy to follow and understandable for an (adult and lay) audience and judges. Finally, the audience and judges should be left inspired and enthused about science, which means that the presenter must have that hard-to-describe but unmistakable quality of charisma. The winner will be the scholar who makes science easy to listen to, entertaining and exciting; the participants need to communicate science, but also share their passion for it.

Regarding charisma, Tubbs (2020, pp. 105–106) collected and listed some items that can improve charisma, such as being prepared (content), asking questions (inviting audience either directly or rhetorically), using an open body posture (e.g., using the hands while speaking), being passionate, energetic and optimistic, speaking in a clear, fluent, forceful and articulate way, and constantly altering the intonation and pacing. This selection leads us to the concept of engagement, and more specifically, to the use of (rhetorical) questions as an engagement strategy, and the one we focus on in this study. These items also show the need for a combination of verbal and non-verbal elements as a main objective in our research.

3. Engagement and scientific discourse: (rhetorical) questions

Communicating science to laypeople implies understanding different aspects that can help a speaker to communicate information more successfully. As mentioned above, dealing with infotainment means that combining entertainment and emotionalization (Engberg, 2023) plays a more important role than simply transmitting knowledge. To achieve this, there is a need for creating a relationship with the audience, probably engaging them in a learning process, or even using some techniques to acknowledge and connect to them (Hyland 2010; Xia & Hafner, 2021). According to prior literature, engagement is “[...] the interpersonal and rhetorical choices

writer/speakers make to attract and hold interest and command attention” (Hyland & Zou, 2021, p. 25). Several engagement devices/strategies have been analyzed for 3MT presentations (the closest genre to our dataset) in recent studies (Carter-Thomas & Rowley-Jolivet, 2020; Hyland & Zou, 2021; Palmer-Silveira & Ruiz-Garrido, 2023), and most are basic in order to communicate science, such as hearer mentions, directives, appeals to shared knowledge, personal asides, titles, visual and aural impact, various personalization devices, or humor and “street cred”. This aim of engaging the audience can be achieved in different ways, as Hyland and Zou (2021) explain, although we cannot rule out multimodality playing a relevant role in the transmission of the message (Fortanet-Gómez & Ruiz-Madrid, 2016; Luzón, 2019; Palmer-Silveira & Ruiz-Garrido, 2023). In fact, these studies deal with questions in varying depths and in different genres (lectures, science documentaries or FameLab talks) which are relevant for attracting the audience’s attention in traditional oral discursive structures, but also as strategies that need to be studied from a multimodal perspective.

As explained above, our research deals with live-streamed, pre-recorded, non-interactive presentations, and focuses on those “rhetorical questions”. As some authors (Fortanet-Gómez & Ruiz-Madrid, 2016; Luzón, 2019; Rossette-Crake, 2019; Palmer-Silveira & Ruiz-Garrido, 2023) point out, rhetorical questions can be a resource used to simulate a dialogue, as well as to engage the audience and attract their attention. While an ordinary question seeks information or an answer from the hearer, “a rhetorical question does not expect to elicit an answer” (Han, 2002, p. 202), especially in a non-interactive presentation, as in this case. These questions are formally interrogative, but differ from other questions in their discourse function (Dehé & Braun, 2020). Supported by Biezma and Rawlins (2017), Dehé and Braun (2020) depict three basic characteristics: (i) they do not expect an answer (as mentioned by Han, 2002), (ii) they do not have the feel of an assertion, although they may have “the force of a strong assertion” (Quirk et al., 1985, p. 825), and (iii) they do not have to be answered, but may be (even if the audience is on the other side of the screen). Additionally, while they are uttered, there are interesting changes in the prosody used, which can be observed in this type of questions regardless of the language used (e.g., Dehé & Braun (2020) in English, Braun et al. (2019) in German, and Beyssade & Delais-Roussarie (2022) in French). Regardless of the different languages, they are often used as engagement strategies, as is also the case in other similar research communication presentations (e.g., Hu & Liu, 2018;

Carter-Thomas & Rowley-Jolivet, 2020; Hyland & Zou, 2021). As such, we expect to find that speakers use rhetorical questions to invite the audience, either directly or in a less straightforward way.

Previous literature agrees on the verbal power of rhetorical questions: “[e]specially in handbooks on giving presentations, the authors state repeatedly that trained, charismatic speakers should make use of stylistic devices such as RQs [research questions]” (Neitsch & Niebuhr, 2022, p. 983). This type of question tends to be context-related, and also a way “to make the listeners active participants in the presentation by inviting them to think about the underlying statement that is conveyed” (Neitsch & Niebuhr, 2022, p. 983), while trying to evoke agreement. Several studies have looked at the use of (rhetorical) questions in academic lectures (Crawford Camiciottoli, 2008; Querol-Julián, 2008; Chang, 2012; Fortanet-Gómez & Ruiz-Madrid, 2014) with different results and proposals regarding their functions, but all of them derive from Thompson (1998). The same applies to the latest references to questions in genres comparable to the one analyzed here, such as the 3MT presentation (Carter-Thomas & Rowley-Jolivet, 2020; Hyland & Zou, 2021), and the final proposals are similar, as they also derive from Thompson. With all this in mind, we propose the following taxonomy, which has been adapted to our own research and applied in our study (Table 1). Accordingly, questions in monologic events are commonly divided into two main functions: content-oriented and audience-oriented questions. The former refers to questions that try to anticipate a reply that the audience may not have to answer; the latter are the kind of questions which are apparently looking for a reply from the audience, which is either verbal or non-verbal, real or symbolic. Each kind of question is divided into other subfunctions, as shown in Table 1.

Content-oriented questions	
1. Focusing information	Questions asked and immediately answered by the speaker. The purpose is to structure the content and attract the audience’s attention.
2. Stimulating thought	Questions with no immediate answer, but which encourage the audience to reflect on the question.
Audience-oriented questions	
1. Evoking audience response	Direct questions expecting a possible answer from the audience, e.g., <i>what would you do?</i>
2. Seeking audience agreement	The speaker looks for the audience’s agreement by means of polar interrogative questions or tags (e.g., <i>isn’t it? This is..., right?</i>)
3. Checking comprehension	These questions or tags aim to confirm the audience’s understanding of the message, such as <i>OK? Right? Get it?</i>

Table 1. Functions of questions to be analyzed in a monologue.

We have already mentioned research on the use of rhetorical questions as engagement strategies (Hyland & Zou, 2021), and some studies look at the position of rhetorical questions according to the move structure 3MT presentations are divided into (Carter-Thomas & Rowley-Jolivet, 2020). Fortanet-Gómez and Ruiz-Madrid's (2014) study is probably the one we feel comes closest to ours, since they look at the multimodal performance of rhetorical questions, but in lectures. We follow the Multimodal Discourse Analysis (MDA) approach (O'Halloran, 2011), without disregarding other perspectives (Kress & Van Leeuwen, 2001; Norris, 2004), according to which messages are transmitted through a combination of linguistic and non-linguistic elements.

In their study, Fortanet-Gómez and Ruiz-Madrid (2014) also proposed a taxonomy (similar to ours) based on previous studies. As they explain, MDA involves kinesics and paralinguage as features to be analyzed when looking at the co-occurrence of verbal and nonverbal features. Kinesics includes the use of gestures, head movements, facial expressions and gaze (see the seminal works by Kendon, 1980, 2002, 2004; McNeill, 1992; Poyatos, 2002, among others, for further details). These gestures can be cataloged as iconic, metaphoric, beats, and deictics, and they attempt to accomplish some functions in discourse, such as cohesive, interactive or pragmatic functions, especially in combination with the linguistic features. Similarly, and as with paralinguage, some aspects such as voice quality, qualifiers or voice types and differentiators (see the seminal work by Poyatos, 2002, for further details) can also accomplish certain discourse functions.

In our study, we analyze gestures (including arm and hand movements), head movements, facial expressions, and gaze, as well as word emphasis in questions, because the excerpts are too short to look at other paralinguistic aspects.

4. Methodology

Our dataset consists of 20 FameLab 3-minute presentations (10 taken from the 2020 finals and 10 from the 2021 finals), delivered by young scientists from different countries on varied topics (see Table 2).

Year	Speaker	Country	Field of expertise/ Topic	Duration	No. words
2020	Sp1	Australia	Medicine	3.20	510
	Sp2	South Korea	Molecular Biology	4.26	513
	Sp3	Great Britain	Medicine	2.50	462
	Sp4	Switzerland	Chemistry	2.53	460
	Sp5	Malaysia	Marine Science	2.54	474
	Sp6	Kazakhstan	Medicine	2.57	498
	Sp7	Brazil	Veterinary medicine	2.50	382
	Sp8	Qatar	Cryptography	3.07	428
	Sp9	South Africa	Environmental Sciences	2.59	414
	Sp10	Egypt	Medicine	3.28	547
2021	Sp11	Spain	Medicine	3.07	472
	Sp12	Australia	Drug creation	3.01	400
	Sp13	Thailand	Mutation of molecules	2.57	491
	Sp14	Egypt	Brain	2.43	380
	Sp15	Russia	Paper as building material	2.32	306
	Sp16	Bulgaria	Chemistry	2.57	498
	Sp17	Netherlands	Immune systems and viruses	2.59	513
	Sp18	South Africa	Environmental Sciences	3.20	487
	Sp19	Mexico	Environmental Sciences	3.29	569
	Sp20	Switzerland	Computer Science	2.38	451

Table 2. Dataset description.

The total number of words used in the twenty presentations analyzed is 9,103 (4,536 in the 2020 edition, and 4,567 in the 2021 edition). Considering that the time regulations mean that these talks can only be three minutes long, the length is quite similar in both years, and they form a fairly homogeneous dataset, as seen in Table 2.

As explained above, the aim of this study is to focus on the use of questions in these non-interactive presentations as a strategy to engage the audience. To that end, we adopted a multimodal analysis approach based on previous works, mainly Thompson's seminal contribution (1998) but also other studies (e.g., Crawford Camiciottoli, 2008; Fortanet-Gómez & Ruiz-Madrid, 2014), as well as two other specific contributions to the topic of 3MT presentations (Carter-Thomas & Rowley-Jolivet, 2020; Hyland & Zou, 2021). Our initial observation of the twenty monologues analyzed led us to identify a specific number of questions used. They were selected manually, according to their intonation and context, and individually by the researchers involved in the study. The selection was then considered and agreed upon in all cases, applying the inter-rater agreement principle. Next, the questions were matched with the very concrete list of functions that can be introduced

by questions (as shown in Table 1 above). The raters again worked individually, and later met to agree on their functions.

Research on 3MT presentations has revealed an expected structure in that genre, and we checked to determine whether we could replicate it in our dataset. Looking at the twenty presentations analyzed, we observed a structure that is also followed, based on the move structure introduced by Hu and Liu (2018). This structure is as follows:

- Orientation (first contact with the audience and introduction of the topic)
- Rationale (motivation of the research)
- Theoretical Framework (theoretical position)
- Purpose (objective or focus of the research)
- Method (how the research was undertaken)
- Results (what has been found or is expected to be found)
- Implications (contribution of the research)
- Termination (ending the presentation and thanking the audience)

This information allowed us to identify the sections where those questions tend to appear and perform a more in-depth analysis of our dataset.

To continue our study, because of the multimodal approach followed, the whole analytical process was completed using Multimodal Analysis Video (MAV) software. This is an interactive software package that allows users to annotate and analyze different types of video recordings, so that researchers can learn how linguistic and paralinguistic features interact to convey a message. This software enables the user to focus on that interaction, annotating all the different features observed in our dataset, thereby performing multiple function tagging. In the MAV we looked at the following features accompanying the questions uttered by the researchers: prosody (word emphasis), gaze, facial expressions, head movements and gestures (arms and hands movements). The multimodal analysis, in combination with the questions and their functions, was carried out by the researchers with no discrepancies in the entire process.

5. Results: identification and classification of questions

Our results confirm that the use of questions follows previous findings to some degree, as few differences were noticed. There are 56 occurrences in

17 presentations (out of the 20 forming our dataset). This specific use of questions is similar to that observed by Carter-Thomas and Rowley-Jolivet (2020), who identified questions in three-quarters of the 3MT presentations included in their study. In our case, the results account for 85% of the total amount of FameLab presentations checked.

The 56 questions occur in a total of 9,103 words, which is the length of the corpus (including the three presentations in which no questions were used). There is one question every 162.57 words in our dataset, or rounding figures up, 6.15 questions for every 1,000 words (61.5 per 10,000). This implies slightly more than the amount observed in previous research on 3MT presentations: Carter-Thomas and Rowley-Jolivet (2020) mentioned a use of 47.2 questions every 10,000 words, whereas Hyland and Zou (2021) reported that the amount observed in their study was 5.5 questions every 1,000 words. Our results therefore reflect a slightly higher use.

The functions of the questions appearing in our dataset were also checked, to see how many of them are content-oriented or audience-oriented. The results show a balanced use of both types of functions, with 27 examples of content-oriented questions and 29 cases of audience-oriented ones. Nevertheless, these initial findings are also distributed according to the subfunctions questions have in our dataset, as shown in Table 3.

Functions	Subfunctions	Cases	Percentage
Content-oriented questions	Focusing information	16	28.57%
	Stimulating thought	11	19.64%
	Evoking audience response	16	28.57%
Audience-oriented questions	Seeking audience agreement	6	10.72%
	Checking comprehension	7	12.50%

Table 3. Distribution of questions according to their function.

We have compared the move structure of these talks with prior studies by Hu and Liu (2018) and Carter-Thomas and Rowley-Jolivet (2020). Our analysis focuses on the moves mentioned in both studies where questions are used to convey a message. From their eight-move structure, we have found questions in six of them as shown in Table 4:

Moves	Number of occurrences
Move 1. Orientation	19 cases (33.93%)
Move 2. Rationale	6 cases (10.71%)
Move 3. Theoretical framework	None
Move 4. Purpose	12 cases (21.43%)
Move 5. Method	7 cases (12.50%)
Move 6. Results	7 cases (12.50%)
Move 7. Implications	5 cases (8.93%)
Move 8. Termination	None

Table 4. Occurrences of questions in moves.

Additionally, we have been able to identify a basic layout, formed by opening, middle (intervening moves according to Carter-Thomas & Rowley-Jolivet, 2020) and closing sections. Despite being short talks, all of them share this basic structure, and the number of questions appearing in the opening section is quite high (19 instances, equaling 33.93% of the total amount), considering the length of the talks. The middle section of the talk is longer, which is also reflected in the amount of questions used (32 instances, equaling 57.14% of the total amount), whereas there are just five examples in the closing sections (equaling 8.93% of the total amount observed).

These results are not exactly the same as those obtained by Carter-Thomas and Rowley-Jolivet (2020), who reported that 30% of the questions they found in their dataset appeared in opening (Move 1) or closing sections (in our case, closing sections combine Moves 7 and 8 as they both tend to be the final part of the talk, although no questions are used to thank the audience). The number of questions in those two sections (opening and closing) accounts for 42.86 percent of the total amount. Our results also show the importance of the opening section, as pointed out by Hyland and Zou (2021), who say that the first 20 seconds are essential for capturing the audience's attention. In fact, our results suggest the initial section is equally important, so that questions are used to engage the audience in the topic of the talk.

Functions	Subfunctions	Cases	Moves	Percentage
Content-oriented questions	Focusing information	16	<ul style="list-style-type: none"> • Move 1: 5 • Move 2: 2 • Move 3: 0 • Move 4: 5 • Move 5: 3 • Move 6: 1 • Move 7: 0 • Move 8: 0 	28.57%
	Stimulating thought	11	<ul style="list-style-type: none"> • Move 1: 1 • Move 2: 2 • Move 3: 0 • Move 4: 0 • Move 5: 4 • Move 6: 2 • Move 7: 2 • Move 8: 0 	19.64%
	Evoking audience response	16	<ul style="list-style-type: none"> • Move 1: 7 • Move 2: 1 • Move 3: 0 • Move 4: 2 • Move 5: 0 • Move 6: 4 • Move 7: 2 • Move 8: 0 	28.57%
	Seeking audience agreement	6	<ul style="list-style-type: none"> • Move 1: 3 • Move 2: 0 • Move 3: 0 • Move 4: 3 • Move 5: 0 • Move 6: 0 • Move 7: 0 • Move 8: 0 	10.72%
Audience-oriented questions	Checking comprehension	7	<ul style="list-style-type: none"> • Move 1: 3 • Move 2: 1 • Move 3: 0 • Move 4: 2 • Move 5: 0 • Move 6: 0 • Move 7: 1 • Move 8: 0 	12.50%

Table 5. Distribution of questions and function within the structure of the presentations.

As shown in Table 5, we also identified the position of the rhetorical questions in our dataset, and how the function of each question is related to the move structure observed. The questions used to begin the presentation tend to be audience-oriented (13 cases out of 19), trying to evoke the audience's response (7 cases, e.g., "*Can you recall the last time you were captivated by nature?*" (Sp5)), checking their comprehension (3 cases, e.g., "*It's the arrangement of these atoms and molecules in a particular fashion, which gives rise to a chair, right?*" (Sp4)) or seeking audience agreement (3 cases, e.g., "*Fascinating, isn't it?*" (Sp4)). The other cases observed in the initial position are content-oriented: 5 examples of questions focusing on information ("*Have you ever researched to stop the time?*" (Sp7)) and 1 stimulating thought ("*[And] what can we do about it?*" (Sp16)).¹

This tendency observed in the initial section of the presentation is slightly different from that observed in the main body of the talk, the central section. In this case, there is a predominance of content-oriented questions (19 cases out of 32), among which 11 cases focus on the information (“*Now, you must be thinking that how did they design such a material, which is good enough to attract CO2?*” (Sp4)) and 8 stimulate thought among the viewers (“*[So I’m asking the question,] what if we try fighting the creepies with the crawlies?*” (Sp12)). The other cases observed are audience-oriented questions (13 cases), among which we have been able to identify questions trying to evoke the audience’s response (7 cases, e.g., “*[Well, that’s amazing, and you can see how well it works,] but you might be wondering what’s in this for you?*” (Sp16)), checking their comprehension (3 cases, e.g., “*No, right?*” (Sp19)), or seeking audience agreement (3 cases, e.g., “*Impressive, isn’t it?*” (Sp13)).

Finally, as regards the concluding remarks in the final part of the 3-minute talks, it is difficult to determine a pattern, as we have only seen 5 examples, but 2 of them are content-oriented, stimulating thought among the viewers (“*What if we all decided to see others not as part of a group, but as a single entity?*” (Sp2)), whereas the other 3 examples are audience-oriented, evoking their response (2 cases) or checking comprehension (1 case).

Apart from the questions themselves, we observed that some of these 56 questions appear together, forming clusters, i.e., a series of questions appearing sequentially and subsequently, as pointed out by Bamford (2005) and Fortanet-Gómez and Ruiz-Madrid (2014). In their opinion, clusters have two possible functions: to elicit an answer by means of reformulations of the first question, and to underline the problematic aspects of the discussion and the lack of an answer, stimulating thought. Our results (7 cases altogether, of which 5 are formed by a cluster of two questions and 2 additional cases are formed by a cluster of three questions) are quite similar to those appearing in prior literature (content-oriented: stimulating thought and focusing on information; audience-oriented: evoking audience response). However, our dataset also includes an example (“*What if I told you 2020 has been a fantastic year? Would you agree with me?*” (Sp6)) in which, after an initial audience-oriented question evoking the audience’s response, there is another audience-oriented question, asking for the audience’s agreement. This is an innovative pattern, not observed in the previous studies mentioned above.

In our dataset, the absence of the audience in front of the speaker is re-defining the paradigm seen in previous editions of the contest. Scientists

must devote greater efforts to conveying the message successfully, as they will not receive any rapport from their audience. The use of some different modes (gaze, movement, gestures, prosody) may help them convey their message more successfully. A further analysis of the non-verbal features used to complement the questions is therefore required. Those non-verbal features may result in supporting and emphasizing the engagement function of questions, as shown in the next section.

6. Results: multimodal analysis of questions

This section will show some multimodal ensembles which are frequent in the delivery of the presentations according to their function in the speech. We use the subfunctions established above, as we noticed some common multimodal features that tend to appear as basic patterns.

6.1. Content-oriented questions/questions focusing information

When asking content-oriented questions while focusing on information, in a large percentage of cases the speakers look directly at the lens of the camera, maintaining clear eye contact with the audience who will watch the video later. Gaze is an important aspect, as the effort to look at an audience that is not physically in the space where the recording takes place is something the observed speakers have been working on. They are aware that direct eye contact is a basic way to engage an audience, and they look at the camera in an effort to involve the audience at home. Speakers know the importance of gazing at their audience, and they use this technique to minimize this problem while focusing on the information they want to share with their viewers.

Additionally, presenters use some other modes while delivering their message. They use gestures and movements to engage the audience, such as maintaining their arms open and moving their head (nodding) while uttering the questions in a gentle and relaxed way, as seen in Figure 1 (Sp11).

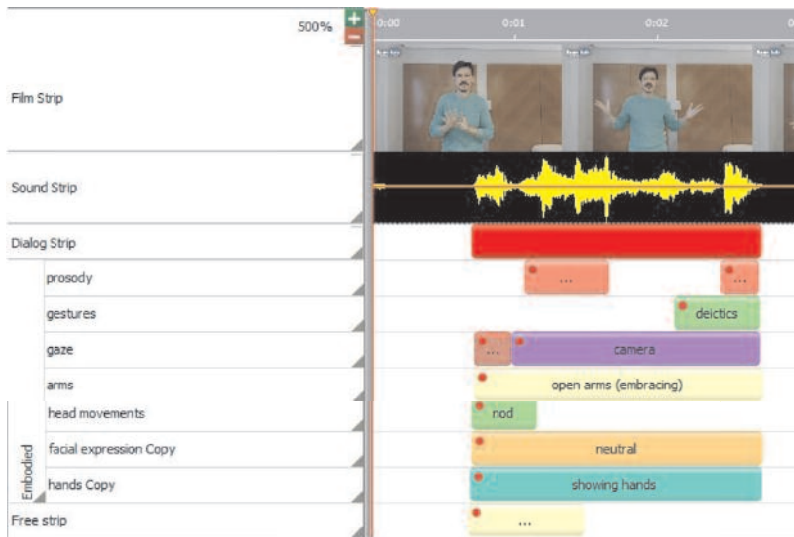


Figure 1. Example of content-oriented questions/questions focusing information.²

In this specific example (*“Was it sorcery or some sort of spell?”*), the speaker starts the question showing the palm of his hands while moving his arms, in an open position that seems to imply trust and truthfulness. He then moves his left arm, probably trying to re-express the concept of ‘sorcery’ by means of a similar expression (‘some sort of spell’). Additionally, through a deictic movement, he is likely to be referring to some common knowledge shared with the audience (‘sorcery’, ‘spell’) and implying the fact that these concepts are far removed from science. In this first example, the speaker stresses the word “sorcery” in his question. This follows the rationale move, trying to convince viewers of the relevance of the research to be presented.

6.2. Content-oriented questions/questions stimulating thought

As for the second subfunction within content-oriented questions, i.e., those stimulating audience’s thought, there is an initial difference with the previous one, which is in the level of eye-contact with the camera observed in the examples analyzed: although the speakers look directly at the camera and try to engage the audience into thinking about the topic, that level of engagement is sometimes jeopardized by some tension. Speakers lose eye-contact for a moment, often because this is a point when they are ready to do something more visual. So, while keeping an initial relaxed position, with

arms wide open, they sometimes change that attitude and grab a prop, an object, in order to show it to the camera: this forces them to change that initial position and stop looking at the camera for a moment. In the example seen in Figure 2 (Sp12), the speaker stops looking directly at the camera for a moment in order to show a glass vessel containing a spider to the lens, while asking the question devised to stimulate thought among the audience (*“what if we try fighting the creepies with the crawlies?”*). This multimodal ensemble (gaze, arms and hands) allows the speaker to enhance the deictic nature of her question. This has been well-rehearsed, the eye movement is very quick, and it takes just a moment. As in the previous example, the speaker uses a rationale move to direct the viewers towards the relevance of the proposal presented—in this case the use of some arachnids for pest control.

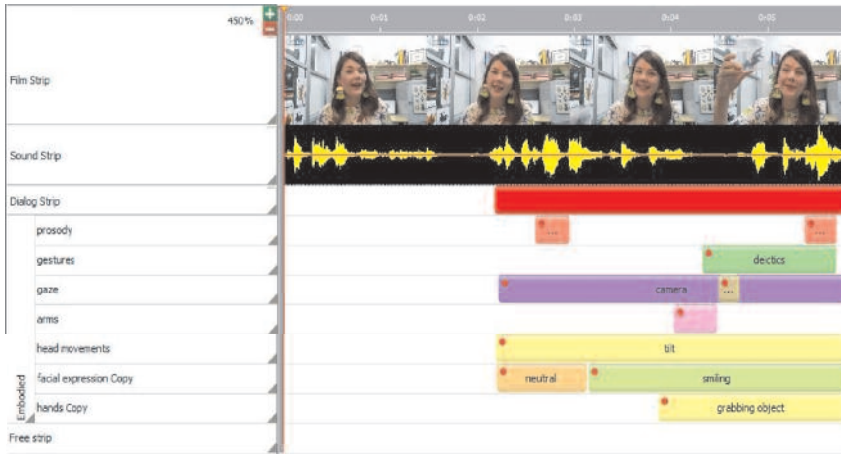


Figure 2. Example of content-oriented questions/questions stimulating thought.

Regarding prosody, and apart from the logical structure of a question, we noticed a slight pause between the two key nouns appearing in the question (the creepies vs the crawlies). While introducing the first term, the speaker stops for a moment and shows the glass vessel to the camera before completing the rest of the question. This is an inter-lexical pause, appearing between two concepts, devised to “facilitate the perceptual interpretation of the speech utterance” (Zellner, 1994, p. 43). This pause is forcing the audience to pay attention to both terms, increasing the engaging power of this part of the speech.

Other relevant features observed are related to facial expressions and head movements. When the speaker starts asking the question, she slightly tilts her head to the left, probably unintentionally, showing confidence in the solution to be offered. She then changes to a smiling position throughout the question. While the speaker starts showing what we have defined as a neutral facial expression, she then smiles while uttering the question. She is probably showing that she is about to offer the solution to the problem previously set out, as well as playing with two non-scientific terms to engage a wider audience.

6.3. Audience-oriented questions/questions evoking audience response

Following the trend observed in content-oriented questions, our dataset also shows that while evoking the audience's response, the speakers maintain clear eye contact with the camera. This effect is increased by their tendency to use their hands to reinforce the engaging power of the message, in many cases showing them onscreen, open, and even holding props.

In Figure 3 (Sp20) a speaker delivers the message (“*Hold on a minute, is that photo really helping you in your learning process?*”) and introduces the question by slightly tilting his head to the right, as an unintentional way of showing the questioning nature of the sentence to be uttered. While looking directly at the camera lens and showing a picture, he includes facial gestures (blinking) that increase his ability to engage the audience. He is helping to convey the purpose of his talk throughout this move, focusing on the steps followed in his study, and offering the audience clues to understand his aim. We can see that just before asking the question, he prepares the audience for it by covering his face with a picture that he shows to the camera, and he looks at the picture by nodding his head. He then looks again at the lens and asks the question. It is at this point when he introduces a deictic movement, pointing with one of his fingers to the photo he is still holding with his left hand. In this case there is a combined use of facial (blinking) and hand gestures to convey the message as a means of attracting the audience's attention. We have also seen that, despite showing a smiling face during the presentation, this disappears during the question. This is a common feature observed in other cases, and it seems that presenters change those smiles for a more serious expression, presumably in an attempt to attract their audience's attention, making it an engagement strategy.

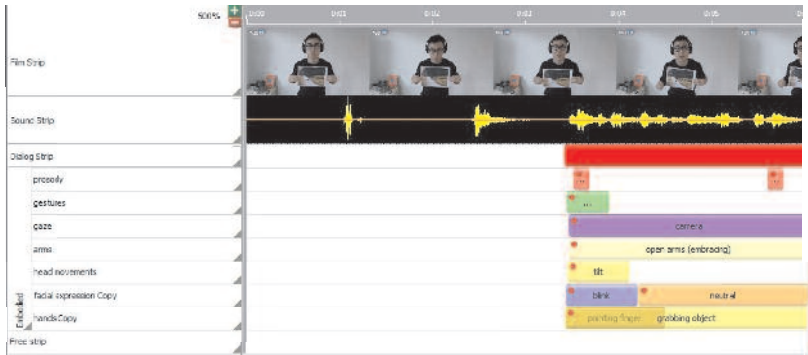


Figure 3. Example of audience-oriented question/ question evoking audience response.

6.4. Audience-oriented questions/questions seeking audience agreement

When seeking the audience’s agreement, our dataset indicates that we can either see question tags or short and direct reaffirming questions, as in the example we analyze (Figure 4, Sp19). The main interest for speakers is to obtain their audience’s agreement, and, as we are dealing with recorded versions of their presentations, that direct rapport cannot be obtained. Speakers therefore have to work on offering hints to their viewers to make them feel as if they were really looking for their agreement while the message is delivered. This implies some special effort and the use of different modes to enhance engagement.

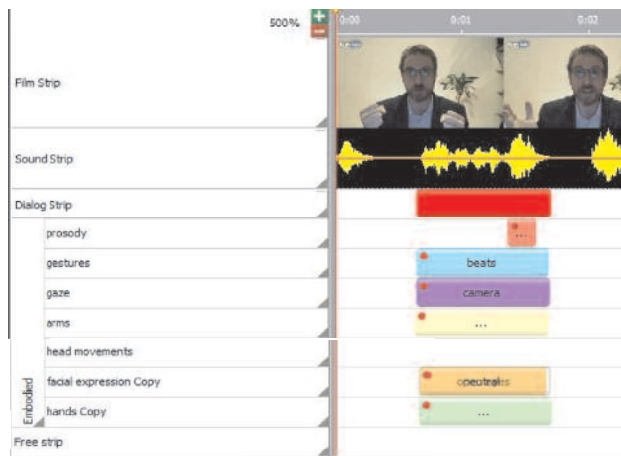


Figure 4. Example of audience-oriented question/ question seeking audience agreement.

There are three elements that can be seen in all the examples gathered. While asking these questions, the speakers look closely at the lens, maintaining clear eye contact with their audience: in our example (see Figure 4), while the presenter is uttering the question (“*Are you excited yet?*”) he gazes at the camera with his eyes wide open. He is using this to introduce the implications move, stressing the significance of the research reported. Additionally, to increase the impact of this message, he combines his gaze with beat gestures (strong arm and hand movements), keeping his hands open facing each other, following the three steps commented by McNeill (1992) (preparation, stroke and retraction).

6.5. Audience-oriented questions/questions checking comprehension

In this case (“*Captain America was frozen in time, but this is science-fiction, right?*”), we can see two major aspects which are common in all the examples collected: smiling faces and, once again, clear eye contact with the camera. This presenter, who has a pleasant smile from the very beginning of the presentation, suddenly stops and opts for a more serious, frowning image in order to introduce the question, engaging the audience with the idea uttered. Additionally, the presenter introduces metaphoric gestures to convey her message, based on providing general knowledge about a comic hero (“*Captain America*”) and the fact that he woke up in a futuristic time thanks to cryogenesis, the main topic of her talk (Figure 5, Sp7).

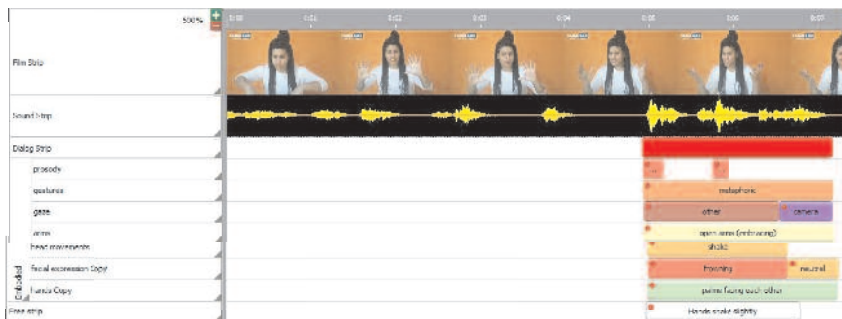


Figure 5. Example of audience-oriented question/ question checking comprehension.

She is therefore mixing fiction and reality to attract the audience, trying to offer a rational view of her talk. In this same example we can also see how the speaker shows the palm of her hands facing each other (a movement that is often used to convey trust and truthfulness), shaking them gently, as well

as shaking her head simultaneously. While moving her hands, she also looks at them, and suddenly stares back at the camera while completing the question using the tag word ‘right’. Additionally, she emphasizes one word, paying attention to the concept of ‘science fiction’, and accompanied by frowning expressions to present that comparison between fiction (Captain America’s story) and science (what can be achieved thanks to cryogenesis today), but also highlighted by the use of movements with shaking hands.

7. Conclusions

Our study focused on the particular use of rhetorical questions in online FameLab 3-minute presentations when they had to be moved to a non-interactive monologue because of the COVID-19 pandemic. The entire dynamics are completely different compared to previous editions, as these scientists are not allowed to offer the talk in a theater in front of a traditional live audience. On the contrary, they are home or at work, the space is small, and the type of the decisions they have to make must be considered well in advance. Due to this change of paradigm, the importance of engagement strategies needs to be stressed.

Rhetorical questions have proved to be an engagement strategy, and we have identified their occurrences and their position within these 3-minute talks. A further contribution of this article is its examination of the multimodal resources employed along with the questions, and how they both reinforce engagement among the audience, especially on an open-access platform to which the general public can have access.

Our results have some similarities with previous studies on different genres mentioned above. The number and type of questions and their distribution follow the tendencies seen in Fortanet-Gómez and Ruiz-Madrid (2014) and Carter-Thomas and Rowley-Jolivet (2020). Although questions are engagement strategies, we have shown that they must be analyzed with the non-verbal communication strategies used by speakers (multimodal discourse analysis). In our dataset, we observed the use of some basic features (head, hand and arm movements, gaze, gestures, facial expressions, and prosody) while presenting rhetorical questions in 3-minute talks.

Permanent eye contact with the camera, simulating looking at the audience, seems to be a key strategy in this digital genre. However, in one of our examples, the speaker enhances his eye contact by opening his eyes wide

while asking the question. Blinking or looking at the object or hands for a short period of time is also a strategy to manage the audience's attention and keep them engaged. This control over the audience is also gained by the use of props while uttering the question, and has different effects depending on the object or the performance itself. Along with the expected and usual intonation of questions, one of the presenters pauses between words to create an additional effect apart from the rhetorical question itself.

Finally, a further interesting multimodal feature involves smiling: whereas just one of the speakers illustrated a smile while uttering the question (probably getting a positive effect in engaging the audience), several presenters show a smiling face before or after the question is uttered, thereby creating a further effect of calling for their audience's attention. Considering that in many presentations scholars have adopted a smiling attitude from the beginning, it is quite noticeable that just when these rhetorical questions appear, smiles are suddenly accompanied by some additional gestures, like hand movements (open palms, fists clenched), arm movements (up and down movements) and some limited blinking. Additionally, the rhythm of the speech slows down somewhat, and the speakers tend to stress the keywords in the question. More importantly, both body movements and prosody modifications appear together, clearly showing that the speakers are aware that the use of rhetorical questions enables them to engage the audience in their communicative purposes. In some ways this combination seems quite natural, as asking a question implies a clear modification of pace and rhythm, although in other cases the effort made by the participants to attract our attention is apparent.

The current study could have adopted a more analytical approach or undertaken a more detailed analysis of the dataset selected. For this initial analysis, we have worked with a limited number of recordings, which we hope to increase in future studies. Additionally, we would like more specific information about the entire process involved in preparing the presentation within this new paradigm: to do so, it would be useful to interview the speakers and learn from their experience and process of preparing and adapting to this new environment.

Like many other types of new emerging genres, FameLab presentations help to disseminate scientific contents among non-scientists. In a world that is changing very rapidly, and where technology is becoming increasingly essential, it is important for scientists to use new media and new genres to

disseminate their knowledge. Infotainment/edutainment can be powerful media for reaching a wider audience, and this type of genre allows scientists to do so.

As practitioners of LSP (Languages for Specific Purposes), we cannot be indifferent to this situation. We must understand this new media, and the digital genres related to it must be part of our own classes. Our students need to be exposed to this new situation in two ways: as consumers of these materials and/or videos, and also as creators or users of the media and the genres. As receivers, they must be aware of the strategies used to engage them with monologic and asynchronous speeches online and be critical of them. As users/creators, they must be aware not only of the diversity of strategies to be used or adapted according to their own styles or personalities, but also of the appropriate multimodal ensembles that can have a better effect on their prospective audience. One way or another, students can first analyze and subsequently put into practice the potential strategies that rhetorical questions can have. This can be applied to any LSP classroom, and not only to the STEM field as seems to be the most common practice. For example, students may learn to recontextualize (Luzón, 2019) the investigation of any researcher (or their own) and try to explain it to laypeople in an attractive way, including rhetorical questions in the process.

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NOTES

¹ We have maintained the exact words uttered by the speakers in the examples selected, respecting the language inaccuracies observed.

² Permission to use the images were obtained from the organizers of FameLab, Cheltenham Festivals.

