Forms and functions of intertextuality in academic tweets composed by research groups

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ABSTRACT

This paper explores the forms and functions of intertextuality in academic tweets composed by research groups. Academic tweets are dialogic and intertextual texts, usually composed by incorporating other voices and taking up text-visual elements from other contexts. Based on the analysis of 300 tweets taken from the Twitter accounts of four research groups in two different disciplines (Chemistry and Medicine), this study investigates the ways in which intertextual practices contribute to the communicative purposes of the genre. The analysis shows that the affordances of Twitter (e.g. hyperlinking, modularity, multimodality) and the purpose of academic tweets shape the forms and functions of intertextuality in these tweets. When composing these tweets academics both reconfigure well-established forms of intertextuality and display novel forms which help them to promote their research, negotiate their relationships with their readers, and share content with diverse audiences.

1. Introduction

Twitter is a networking site increasingly used by academics to promote and share their research activity and output, connect with peers, diffuse their ideas and opinions, and reach the general public (Côté & Darling, 2018; Mohammadi et al., 2018). Academics achieve these purposes by creating their own content, but also by sharing information taken from other texts and content produced by others (Puschmann, 2015). Since tweets are highly intertextual and dialogic texts, where users take up and repurpose semiotic resources from other places and enter into discursive relations with others (Gillen & Merchant, 2013), a focus on intertextuality seems particularly relevant to understand how academic tweets are constructed and interpreted.

Twitter is a conversational platform, whose technological affordances (e.g. interactivity, reach, hyperlinking) and main distinguishing features (e.g. hashtags, @mentions, retweeting) facilitate dialogue and the creation of intertextual relations. Hashtags enable tweeters to connect their tweets to other thematically related tweets and thus create intertextual chains (Bonilla & Rosa, 2015). The @mention feature serves to refer to other users and enables readers to access these users' profile (Honeycutt & Herring, 2009). The retweeting button allows users to forward a tweet to others (Puschmann, 2015) and hyperlinks make it possible to incorporate information from non-Twitter websites, giving readers access to complete texts. Finally, the multimodal affordances of the medium, and the search and aggregation functions of Twitter, support "multimodal quotation" (Zappavigna, 2022): tweets tend to include not only written text, but various types of visual resources (pictures, videos), which are often taken from other sources and recontextualized to achieve the purpose of the tweet.

Studies of Twitter for academic communication have focused on academics' motivations for tweeting, revealing that in academia

Twitter is a tool for sharing content, self-promotion and engagement (e.g. Luzón & Pérez-Llantada, 2022; Puschmann, 2014; Velet-sianos, 2012). However, although intertextuality plays a key role in meaning-making in tweets, research is lacking on the multiplicity of texts and voices in academic tweets and on how intertextuality contributes to achieving the purpose(s) of these tweets. Research on intertextual relations in academic tweets has been restricted to the analysis of Twitter citations (i.e. reference to a scholarly publication or another digital document by mentioning the URL or the title) (Priem & Costello, 2010; Weller et al., 2011). These studies have analyzed the distribution of citations or their impact, but have not examined how they contribute to the construction of the tweet. There is no study of the intertextual practices engaged in by academics in Twitter to increase their visibility, share content, build networks and enter conversations. The aim of this study is to contribute to filling this gap by exploring how intertextuality works in academic tweets composed by research groups, how it is affected by the affordances and practices of digital text production and by the particular features of digital textuality, and how it contributes to the communicative purpose(s) of the tweet. The study seeks to answer the following research questions.

RQ1: What different types of intertextual representations occur in the academic tweets of research groups, that is, in what ways do these tweets refer to or incorporate other texts?

RQ2: What functions do intertextual representations serve in the tweets? This involves analyzing the sources that are referred to (i. e. the voices that are incorporated to the tweet) and how these texts are recontextualized to achieve the purpose(s) of the tweet.

Answering these questions will provide information on what kind of relations with other texts and other social actors are facilitated by Twitter textuality and on how these relations contribute to constructing meaning in these tweets and to accomplishing social actions.

To answer these questions, this paper provides a qualitative analysis of intertextuality in academic tweets produced by four research groups. A quantitative approach, which seeks to determine the features of a type of text by quantifying them, is not adopted here because tweets are fluid, highly unstable texts, which exhibit considerable variability and creativity. The purpose of this study is, by contrast, to highlight and analyze forms of intertextuality and their function in academic tweets, with no attempt at quantifying them.

2. Twitter in scholarly communication

Research on how scholars use Twitter has provided insights into the purpose(s) and intended audiences of academic tweets. Academics tweet to share resources and publications with various publics but mainly with their peers (Côté & Darling, 2018; Mohammadi et al., 2018) and to promote their work and increase their visibility (Luzón & Albero-Posac, 2020; Luzón & Pérez-Llantada, 2022). They also tweet to engage in social interaction with peers, commenting on academic issues, discussing emerging research and sharing useful resources, and to develop their disciplinary networks (Choo et al., 2015; Veletsianos, 2012). Tweets are also used to communicate with peers during academic conferences (Luzón & Albero-Posac, 2020; Puschmann, 2014; Weller et al., 2011). By including the conference hashtag in their tweets, users (organizers, attendees and non-attendees) can connect the tweets to the broader conference conversation, discuss issues related to the presentations, interact informally, and share various resources (e.g., their own papers and posters, other researchers' papers, datasets) related to the conference. Finally, academics also harness the potential of Twitter to reach a more diverse audience, and use it for communication not only with the scholarly community but also with other publics (media, educational organizations, general public, practitioners) (Choo et al., 2015; Côté & Darling, 2018; Puschmann, 2014; Tardy, 2023). Twitter helps academics to disseminate science and research results to the interested public and to increase public engagement with science.

Since one of the primary uses of academic Twitter is the dissemination and sharing of information, studies have also analyzed the type of content that is cited and shared by academics on Twitter. Academics often cite scholarly publications (Jung et al., 2016; Priem & Costello, 2010), i.e. they make reference to a scholarly publication by mentioning the URL or by linking to an intermediary webpage that in turn includes a link to the publication. Research suggests that Twitter citations differ from citations in scholarly papers, since they do not provide support for arguments, but serve promotional and networking purposes. Jung et al. (2016) observed that Twitter users cite papers mainly to share them or to promote them to their followers. In addition to published papers, scholars cite other types of texts. Weller et al. (2011) distinguished between external citations, which include all URLs in tweets (e.g. links to publications, blogs, conferences, slides, media, non-scientific publications), and internal or inter-Twitter citations, i.e. retweets. Studies on Twitter citation have revealed that scientists' tweets include a higher number of URLs than the general population of tweets, that scholars retweet more than typical users and that citation practices (e.g. types and frequency of links, frequency of retweets) vary between disciplines (Holmberg & Thelwall, 2014; Weller et al., 2011).

Twitter affordances for interaction and reach have facilitated the emergence of new Twitter genres whose purpose is to discuss research or disseminate scientific knowledge. Two examples are Twitter-based journal clubs, where researchers can examine and discuss new papers (e.g. the International Urology Journal Club on Twitter, https://twitter.com/iurojc), and "tweetorials", i.e. long Twitter threads written by experts to explain complex concepts to public audiences or share research findings (Graham, 2021; Tardy, 2023). Graham (2021) distinguishes various emerging tweetorial subgenres: article or preprint review, misinformation corrective, clinical experience report, and literacy support tweetorial, where key scientific concepts are reviewed.

Twitter is therefore used by academics to engage in a variety of social purposes, and new Twitter (sub)genres and practices are emerging to meet various rhetorical needs. Since most uses of academic Twitter involve responding to other texts in various ways (sharing or discussing other texts, entering broader conversations around specialized topics), we are likely to find a variety of intertextual forms in these tweets. An analysis of these forms and their functions might contribute to our knowledge of how academic

tweets are composed.

3. Intertextuality and recontextualization in social media

Drawing on Bakhtin's (1981) work on dialogism and heteroglossia and his idea that when using language we revoice the words of others, Kristeva (1980) coined the term "intertextuality" to refer to structural relationships existing between texts and claimed that "any text is constructed as a mosaic of quotations; any text is the absorption and transformation of another" (Kristeva, 1980, p. 66). Fairclough (2003, p. 39) defines the intertextuality of a text as "the presence within it of elements of other texts (and therefore potentially other voices than the author's own) which may be related to (dialogued with, assumed, rejected, etc.) in various way". That is, every text is created by accommodating other voices. Fairclough (1992) proposed the terms "interdiscursivity" to distinguish between two types of relations between texts. While "intertextuality" refers to the "property texts have of being full of snatches of other texts" (p. 84), which involves incorporating others' words or making reference to previous text(s), "interdiscursivity" refers to the incorporation of conventions associated with other genres or discourse types. The distinction between intertextuality and interdiscursivity has been adopted widely in discourse analysis to account for the diverse ways in which a text derives its meaning from previous texts (e.g. Bhatia, 2004). In this paper, I focus on the concept of intertextuality, although in digital genres intertextuality and interdiscursivity are closely intertwined and difficult to separate in practice. Research on intertextuality has identified various ways of intertextual representation (i.e. of representing or referring to others' voices in one's text), including direct quotation, indirect report or summary, mentioning, comment or evaluation, presupposition, negation, irony, re-use of text segments from documents written within a single organization or group (Bazerman, 2004; Fairclough, 1992; Shaw & Pecorari, 2013).

An important aspect to consider in the analysis of intertextuality is that, as Bazerman (2004, p. 94) states, "intertextuality is not just a matter of which other texts you refer to, but how you use them, what you use them for, and ultimately how you position yourself as a writer to them to make your own statement", that is, how it helps the writer to accomplish social actions. In order to understand the function of intertextuality as a meaning-making and text-creation practice in academic tweets, the concept of recontextualization is apposite. When a fragment of a text is lifted from its original context and used in a new context, it is recontextualized, i.e. it acquires a new meaning in the new context (Bazerman, 2004; Fairclough, 1992; Linell, 1998). The process of recontextualization often involves textual changes, such as the "simplification, condensation, elaboration, and refocusing" of the original text (Linell, 1998, p. 155). In the digital environment, text reusing, remixing and embedding are prominent text-creation practices, which involve selection of texts[1] (or fragments of text) to transfer and recontextualize (Adami, 2012, 2014; Johansson, 2019). Selected textual elements are extracted from their original context and edited to convey new meanings, and meet the goals of the new text (Adami, 2012). As Adami (2014, p. 224) contends, in the online environment, the affordances of the modes and of the media foster networked distribution of content and new recontextualization and meaning-making practices: "any text can be linked to another, forwarded into another space, embedded in some other text".

Research on digital discourse has shown that digital texts reconfigure forms of intertextuality found in other media (e.g. quotations), but also use new forms of intertextuality facilitated by technological affordances (e.g. linking to other websites that 'incorporate' relevant content to the digital text). Johansson (2019, p. 154), for instance, shows how the genre of online political opinion review is constructed by integrating written quotations and what she calls "digital quotations" (i.e. "a tweet, video, or other digital element that is recontextualized from a digital context by being copy-pasted into digital news texts"). Other studies have analyzed how texts are shared and circulated on social media in different semiotic modalities, showing that in social media intertextuality often involves multimodal recontextualization. Adami (2014), for instance, discusses what she calls "crossposting", i.e. a form of digital remediation in which an artefact uploaded on an online platform is recontextualized (e.g. reposted, embedded) in other online spaces by making use of the multimodal affordances of each space.

Much research on intertextuality in social media, and particularly in Twitter, has focused on various types of quotation practices and their communicative functions. Retweeting, in particular, has been paid considerable attention. Herring (2013, p. 13) considers retweeting as "a form of quoting that is adapted to, and reconfigured by, the Twitter environment". Puschmann (2015) and Gruber (2017) also analyzed retweeting as a quotation practice whose function and form are shaped by technology. Research on retweeting has emphasized its social and interpersonal function (Boyd et al., 2010; Gruber, 2017; Puschmann, 2015). In addition to their informational value, retweets serve to establish links between the retweeter, the retweeted user and the readers (Boyd et al., 2010) and to reinforce social ties between members of a community. Regarding the expression of stance, while uncommented retweets tend to have an endorsement function (i.e. the retweeter aligns with the stance expressed in the original tweet), in commented tweets the retweeter tends to evaluate the content of the retweeted text (Gruber, 2017). Retweeting also has an interactional function, since it introduces new voices in the Twitter interaction. This function is particularly evident in commented retweets, i.e. tweets where the retweeted message is prefaced by a comment. Gruber (2017, pp. 4–5) points out that these retweets "establish staged 'micro-dialogues' between the retweeter and the retweeted text (and/or its author) in front of the retweeter's followers". It should be pointed out that retweets may have a variety of functions (see Boyd et al., 2010), which depend on the community to which the tweeter belongs and the specific context of use (Puschmann, 2015).

Some studies of intertextual practices in social media have also analyzed multimodal quotation practices, involving memes (Vandelanotte, 2020; Zappavigna, 2022) or quote cards (Pfurtscheller, 2020). A meme is a highly intertextual element; it is a group of

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[1] For the purpose of this work, the term "text" is used to refer not only to written discourse, but to a unit of discourse where several semiotic resources can be combined for meaning making.

digital items which make reference to previous texts and events (usually mass culture texts) and are "circulated, imitated, and/or transformed via the Internet by many users" (Shifman, 2014, p. 41). The purpose is usually to express subjective responses in a humorous way (Vandelanotte, 2020). A quote card, another form of multimodal quotation, is a combination of a visual quotation and a written quotation extracted from a previous text and recomposed for recirculation on social media. In Facebook posts, quote cards serve as "news bites" or "appetizers": they draw attention to the linked paper and encourage the readers to visit it (Pfurtscheller, 2020).

All these studies reveal that forms of intertextuality are reconfigured in the digital medium, and that the affordances of the medium facilitate new and more complex types of relations between texts, and new functions for quotation.

4. Corpus and method

4.1. Corpus

The dataset analyzed in this study is a corpus of 300 tweets taken from the Twitter accounts of four research groups in two different STEM disciplines: Chemistry- Martin Group, Fors Research Group- and Medicine -SOLTI Group and TOPIC Research Group. Medicine was chosen because Twitter has become an important tool for academic communication and science dissemination in this discipline (Choo et al., 2015; Tardy, 2023); and Chemistry because researchers in this discipline seem to use Twitter for scholarly communication, and to engage in intertextual practices such as retweeting, more often than researchers in other disciplines (Holmberg & Thelwall, 2014). The Twitter accounts were retrieved by using the Google searches: "Twitter + research group + medicine" and "Twitter + research group + chemistry". To be selected for the study, the research groups' Twitter accounts had to meet two criteria: (i) active accounts with regular tweets and a relatively high number of followers (more than 1,000, although three of the groups had about 4,000 followers); and (ii) all or most of the tweets should be written in English (only the Twitter profile of one of the groups includes some tweets in Spanish). The Chemistry groups do research on organic Chemistry and their Twitter accounts are run by PhD students in the group. The SOLTI research group does research on breast cancer and organizes workshops for practitioners and patients. The TOPIC research group does research on mental health and states on their webpage that their work is "underpinned by close consultation with children, young people, parents/carers, and practitioners" (https://www.psy.ox.ac.uk/research/topic-research-group). Hence, for the Medicine groups sharing content with audiences beyond academia, and not only with peers, is important. Since the groups are interested in sharing different types of content with different audiences, analyzing the four datasets may reveal a wide range of intertextual practices.

Starting on 16 December 2021 and in reverse chronological order, the first 75 tweets from each account were collected. Although this may seem a relatively small corpus, it provides enough analytic data for the type of study (i.e. qualitative and exploratory) reported in this paper (see also Tardy's (2023) qualitative study of academic tweets with a small corpus). The dataset included tweets and retweets, both commented and uncommented. The tweets making up the corpus were publicly available and were collected manually and saved as PDF documents.

Table 1
A framework for the analysis of intertextuality in academic tweets.

1. Type of intertextual representation
• Retweet
o Commented
o Uncommented
• Written quotation
o Direct quotation
o Summary or paraphrase
• Multimodal quotation
o Embedded unmodified visual
o Quote card
o Meme
• Hyperlink to other sites
• Digital mentions: hashtags, @mentions
• Template reuse
2. Source type
o Internal
o External
3. Type of content that is shared
• Information on research activity or outcomes (e.g. new publication, conference presentation)
• Positive information on/evaluation of the group
• Positive evaluation of other researchers/groups
• Expressions of thanks or congratulation
• Announcement of new positions or calls (e.g. conference calls, calls to participate in a project)
• Useful resources for the audience (e.g. publications, reports, videos)
• Request to take action
• Discipline related humor (e.g. discipline related memes)

4.2. Method

The purpose of this paper is to identify the forms of intertextual representations in academic tweets and their function. Therefore, I followed the procedure proposed by Bazerman (2004) for analyzing intertextuality: (i) identify the traces of other texts in the corpus compiled for analysis; (ii) determine how these instances of intertextuality are expressed (e.g. direct quotation, paraphrase); (iii) interpret the intertextuality, i.e. consider "how or for what purpose the intertextual element is being used in the new text" (p. 92). Following this procedure, I first identified instances of intertextuality in the tweets in the corpus, considering that the elements that may be incorporated from other texts may be written text but also (audio)visual elements. It should be pointed out that it is not always possible for the analyst to identify all examples of intertextuality, since the text may allude to discourses with which the analyst is not familiar. Using Atlas.ti (software for qualitative content analysis), I coded these instances of intertextuality in terms of (i) type of intertextual representation, i.e. how the intertextuality is expressed, how other sources are referred to or incorporated in a text; (ii) type of content that is incorporated in the tweet; and (iii) source. The coding of intertextual instances according to type was done by starting with an initial list of anticipated codes based on previous research on intertextuality and on Twitter textuality (e.g. Bazerman, 2004; Gruber, 2017; Shaw & Pecorari, 2013; Zappavigna, 2022). However, since intertextuality in tweets may be quite different from intertextuality in printed texts, this initial code list was complemented with codes generated on the basis of my observation of the data, using the "coding in vivo" option of Atlas.ti. The type of content that is incorporated in the tweet was also coded following an inductive approach, starting from the data. Regarding the source, a distinction was made into internal (i.e. the source was a member of the group, or an institution related to the group, such as the research center where the group works), and external (e.g. another researcher or group, a journal, a magazine). This distinction seems to be relevant in this context, since groups tend to retweet tweets by their members, and incorporate intertextual representations of their own previous texts (e.g. summaries, links), thus increasing spreadability of their own content. Table 1 presents the framework of analysis.

The second step consisted in examining the instances of each type of intertextual representation at the micro-level, adopting a contextual and functional approach (Bazerman, 2004), in order to determine how the intertextual elements were integrated into the tweet and what function they had in the tweet. This was done by considering the purpose of the tweet and examining how the intertextual element contributed to that purpose. For this analysis, I drew on previous research (Luzón & Pérez-Llantada, 2022) which revealed that tweets by research groups may have one or more of the following purposes: (i) community building and networking (e.g. tweets used to share resources and disciplinary information or to evaluate other researchers positively); (ii) self-promotion and publicizing of their research output (e.g. tweets used to notify that a new paper has been published or inform of the members' achievements); (iii) calls to action (i.e. tweets encouraging various stakeholders to do something); and (iv) public dissemination and outreach (i.e. tweets intended to disseminate academic knowledge to wider audiences).

5. Results and discussion

In this section I discuss each type of intertextual representation found in the corpus and its function, i.e. how it is integrated into the tweet to contribute to the tweet's purpose. This will help to unveil research groups' intertextual practices in Twitter and the rationale behind them.

5.1. Retweets (commented and uncommented)

Retweets are digital quotations not modified by the user, which, as pointed above, may be commented (i.e. prefaced by a comment). A large number of tweets in the corpus (66.66%) were retweets. This is in agreement with previous studies of academic Twitter (Holmberg & Thelwall, 2014) and indicates that retweeting serves important functions in the Twitter activity of research groups.

Retweets in the corpus always helped to spread and amplify previous messages, and thus "share" the content of other tweets. This "sharing" served more specific purposes in the corpus. One prominent function is promotion of the group. Groups usually retweet tweets where a user provides positive evaluation of the group, informs of the group's new publications, achievements or academic outputs, thanks or congratulates the group, or shares the group's resources. The source of the retweeted tweet may be internal or external. A common practice, illustrated by Fig. 1,[2] is retweeting a tweet by one member of the group (internal source), where their research is promoted, thus echoing and amplifying the message.

Retweeting others' tweets about the group also serves a promotional purpose. In example 1 below by retweeting a tweet by an external source (a researcher not belonging to the group), the group spreads the positive evaluation of one of the members ("amazing") to their audience, enhances the visibility of the group members and, at the same time, seeks to acknowledge the original tweeter. Fig. 2 provides an example of a commented retweet used for promotion. A tweet where one of the group's papers is promoted by the Twitter account of the journal (external source) is retweeted and commented by the group to spread it and add positive evaluation. The embedded tweet serves to bring the paper to the audience's attention and provide a link to the publication, and the comment is used to present the main finding or claim, inform that it is a collaboration with another group, helping thus to strengthen the links with that group, and evaluate the paper positively ("new", "we can rapidly").

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[2] To ensure anonymity, the profile pictures have been deleted in the figures and the names of individual posters have been replaced by "user", "user 1", "user 2".
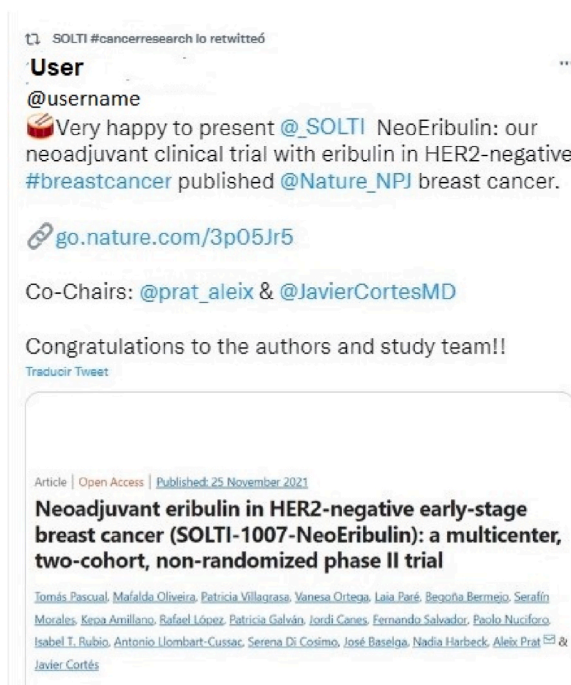
Fig. 1. Retweet of a group member's tweet *(@SOLTI)*

Fig. 2. Commented retweet used for promotion (*@MartinLab_ICIQ*)

(1) ForsGroup retweeted

Angie R Angeles@angierangeles:

A great pleasure to have @brett_fors from @Cornell as our plenary speaker @ACSorganic 2021 GRS! Brett was the first graduate student speaker at the inaugural 2010 GRS. His presentation on "Development and Applications of New Synthetic Strategies for Polymer Science" was amazing!

[+*picture of Brett Fors delivering his talk*] (*@forsgroup*)

Retweets also served a social and networking purpose (see Boyd et al., 2010): in addition to acknowledging other voices (as illustrated in example 1 above), they may be used to help other groups/researchers spread their announcements, calls, job postings, and information about their research output, which in turn helps the group to maintain interpersonal relations. In example 2 below the group retweets an announcement of a PhD position, upon the original tweeter's request to retweet. Retweets spreading others' information have a two-fold networking function: they contribute to establishing social relations with other researchers by helping them amplify the audience of their tweets, and, at the same time, they spread information that may be useful for members of their disciplinary community.

(2) *ForsGroup retweeted*

Kathrin Hopmann@HopmannKathrin:

Please RT: Open PhD position in COMPUTATIONAL CHEMISTRY, with focus on CO2 conversion. Location: Norway. Part of @Co2perate_ITN
(EU grant 859910). Fully funded with great salary and research conditions (*@forsgroup*)

Uncommented retweets were also used to endorse others' thoughts and publicly agree with others (see Gruber, 2017). These are retweets where the retweeted source expresses his/her opinion or stance on something, or thanks or congratulates somebody. In Fig. 3a, by retweeting the message by NHS Maudsley, the TOPIC research group endorses its support to #InternationalPronounDay. In Fig. 3b retweeting serves to share another researcher's conversation and endorse her opinion ("I believe these results …"). Both examples show that in a single tweet there may be various layers of prior texts and quoted voices. In Fig. 3a the TOPIC group incorporates to their tweet the NHS voice, and in turn the voice of the producers of the embedded YouTube video, thus aligning with these voices and displaying the group's position regarding a social issue. In Fig. 3b, the SOLTI group incorporates the voices of both user 1 and user 2.

Although retweeting always involves interacting and introducing other voices into the tweets, some commented retweets were used to answer back explicitly and establish a micro-dialogue with another user. In Fig. 4 the tweet incorporates a previous tweet where a postdoc student expresses her excitement of working with the group. The comment is the explicit response to this researcher. This collegial and warm response in front of the group's followers helps to construct a positive image of the group.

Retweets were also very frequently used by the groups to amplify the sharing of resources (both their own and others' resources) with peers or with wider audiences. In the case of commented retweets, the retweeted tweet links to the resources, and the comment usually provides positive evaluation, to encourage the readers to access these resources (e.g. "fantastic resource" in Fig. 5).

Retweeting also served to encourage the readers to take action. Groups retweeted tweets informing of conferences, talks or courses (so that readers register), or studies where readers can participate. In Fig. 6 the group retweets a tweet where parents are asked to participate in one of their studies (My-CATS Study), thus amplifying the audience for the tweet and increasing the number of people who can take it up and respond to it in several ways, i.e. by spreading it further, by liking it, by participating in the study. In the case of commented tweets, the comments usually include evaluative vocabulary and directives, in order to provide positive evaluation of the event and repeat the request in the source tweet.

In sum, research groups retweeted for promotional and networking purposes (e.g. endorsing others' opinions, helping them to spread their tweets), but also to amplify the audience of tweets calling to action or intended to disseminate knowledge to wider audiences.

5.2. Written quotation: direct quotation and summary

In the tweets in the corpus, there were very few cases of direct quotation, i.e. incorporation of the exact words of a previous text. Direct quotations occurred only in tweets by the SOLTI group and were used to emphasize and bring to the audience's attention somebody's message. However, a frequent type of intertextual representation in the corpus was a summary of what had been said or written in a previous text, frequently used by the groups to promote their own research. In tweets publicizing their new publications,
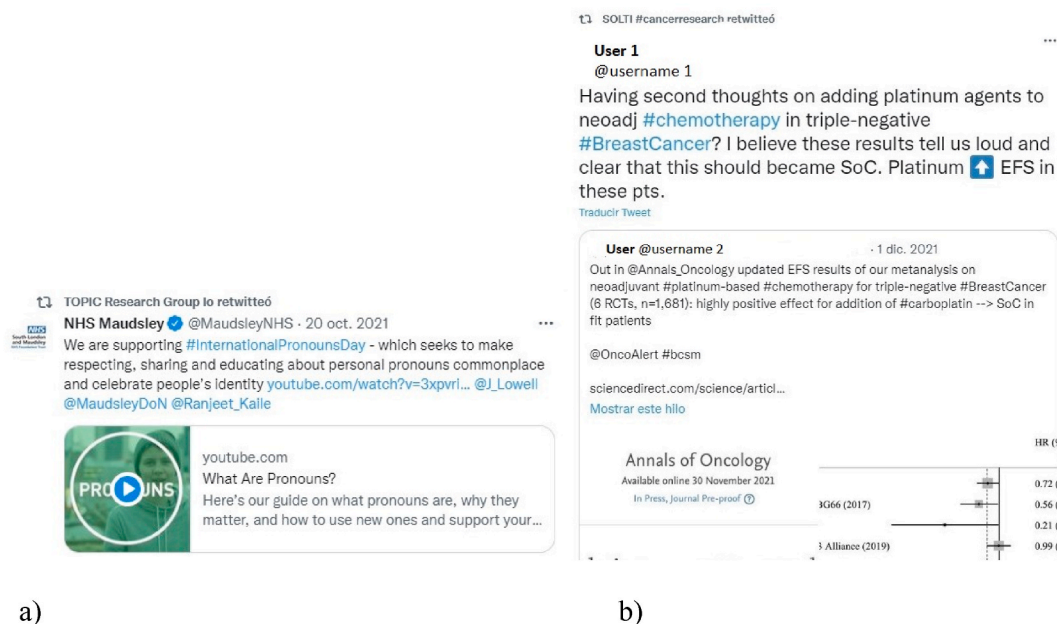

a)   b)

Fig. 3. a and b. Retweets endorsing others' opinion (*@topic-group* and *@SOLTI*).

Fig. 4. Dyadic exchange in a retweet (@*forsgroup*)

Fig. 5. Tweet to share resources (@*topic-group*)

Fig. 6. Uncommented retweet encouraging action (@*topic-group*)

groups often provided a brief summary informing about the topic or about the main findings and evaluating them positively, in order to attract other researchers, together with a link to give readers access to the full paper (see Fig. 7). That is, the selected text (i.e. parts of the research paper) is recontextualized by condensing it (to meet the requirements of the tweet format) and by stressing the positive evaluation ("reduce … without the need"), in agreement with the promotional purpose of the tweet.

An interesting communication practice in the Twitter account of the SOLTI group is composing threads of tweets to provide long summaries of their papers or conference presentations/posters, thus making use of twitter threads (see Graham, 2021; Tardy, 2023) for promotional and research visibility purposes. Fig. 8a shows the first tweet in an 8-tweet thread which recontextualizes the group's poster discussion at the SABCS21 conference. Each of the tweets in the thread embeds a picture of the poster and a brief description of what is represented visually (see Fig. 8b). The tweets are intertextually connected with the poster presentation in two ways: they incorporate pictures of the conference poster, and they echo the poster presentation in a condensed Twitter-suitable form. The database of the SOLTI group also includes a 9-tweet thread summarizing one of their papers. The tweets in the thread incorporate a figure/table taken from the journal paper and a brief written summary of the most important information of the paper related to the visual. That is, written and visual elements of the research paper are taken up, modified and recomposed to fit the purpose of the tweetorial genre.

Some conference tweets (see Luzón & Albero-Posac, 2020; Puschmann, 2014) in the corpus also summarized (and evaluated positively) other researchers' presentations (see example 3). These tweets, written by the group organizing the conference, served both a self-promotional and networking purpose: they simultaneously promoted and increased the visibility for the conference (and thus the
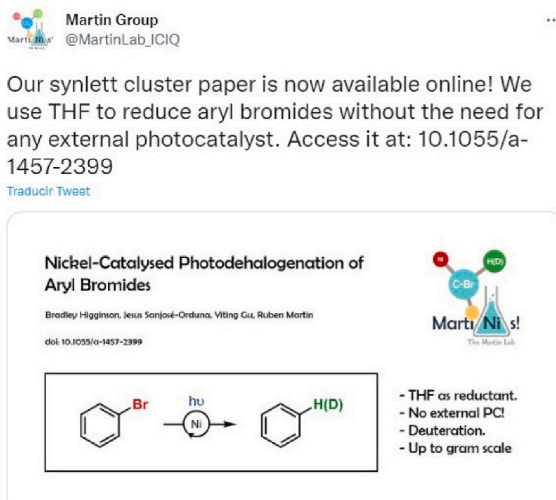
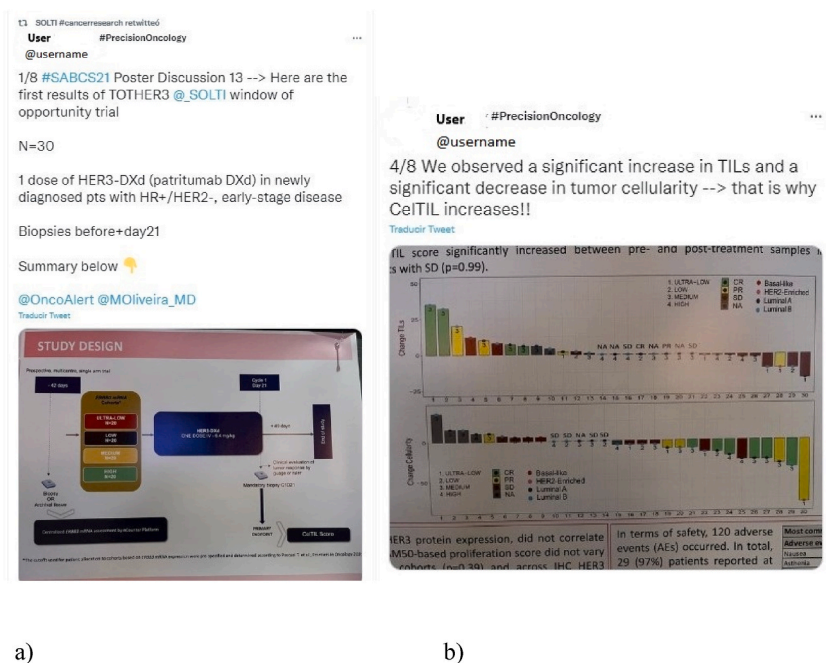**Fig. 7.** Tweet informing of new publication (@*MartinLab_ICIQ*)

a)

b)

Fig. 8. a and b. Parts of a tweet-thread summarizing a poster presentation (@*SOLTI*)

group) and the presenter's research.

(3) SOLTI#cancerresearch
   Dr. Elaine Mardis from @nationwidekids offered a comprehensive talk about the latest research initiatives based on ge-
   nomics, from liquid biopsy analyzing methylation patterns to spatial immune profiling in FFPE samples #envisionsummit
   2021 @prat_aleix @evaciruelos
   [+*picture of the presenter and picture of the first slide of the presentation*] (@*SOLTI*)

5.3. Multimodal quotations

5.3.1. Embedding unmodified visuals
   Tweets from research groups tend to embed visual elements and multimodal ensembles (e.g. graphical abstracts, pictures of

conference slides, embedded videos), which are taken from other contexts with no modification. The aggregation affordances of social media platforms make it extremely easy to replicate, recontextualize and recirculate these elements. Some of these elements are instances of genres designed to be spread via social media, e.g. graphical abstracts, embedded short videos. Tweets announcing a new paper by Chemistry groups usually embed the graphical abstract, as a way to summarize the paper without surpassing the word limit of the tweet, and attract the readers to the research paper. Slides from conferences were also recontextualized in tweets in the corpus analyzed. In conference tweets, the group may embed pictures of their own slides (or other researchers' slides), in combination with a brief summary text, to help the readers visualize and provide evidence of what is said in the text. Conference tweets may also embed slides of other researchers' presentations to comment on them in the tweet, evaluate them or initiate a discussion or conversation with the presenter based on the visuals, which helps the tweeters to assert their authority as experts. In Fig. 9 the quoted visuals enable the tweeter to connect to and replicate the context of the conference presentation, and provide a referent so that the audience (and the presenter) can understand the tweeter's evaluation ("very nice data") and questions.

5.3.2. Quote cards

A visual unique to social media is "quote-cards", multimodal ensembles extracted from a previous text, aimed at encouraging the reader to visit it (Pfurtscheller, 2020). The tweets in the corpus displayed a wide variety of forms of quote cards, intended to attract diverse audiences towards the source text. The most frequent type consists of a graphical abstract and a short quotation taken from the journal paper (usually consisting of the title and fragments of the abstract), incorporated in tweets aiming at publicizing a new publication (see Fig. 10a). The corpus also featured quote cards from other digital texts (e.g. a guide, a report), consisting of a text quotation and the picture of the quoted person, or a text quotation and a quote-related visual (see Fig. 10b).

5.3.3. Memes

Memes also occurred in the corpus of tweets, although only in the Fors group dataset. Intertextuality was used here for a humorous effect, which helps to create intimacy and solidarity. In most of these memes, in order to obtain the intended humorous effect, users need two types of knowledge: knowledge of the previous text, i.e. a template (an image, a phrasal template, or both), which readers are expected to recognize, that is, familiarity with the meme; and disciplinary knowledge. Solidarity is constructed because only members of an exclusive group (e.g. discipline members, PhD students) can get the full humorous effect. Fig. 11a is a variation of the "If I take one more step" meme, which draws on a scene and words of the Lord of the Rings movie where one of the characters (Sam) says: "If I take one more step, it will be the farthest away from home I've ever been". In Fig. 11a the image has been modified in order to construct the characters as polymers and the phrasal template ("if I take one more (step)") has been completed to construct a sentence
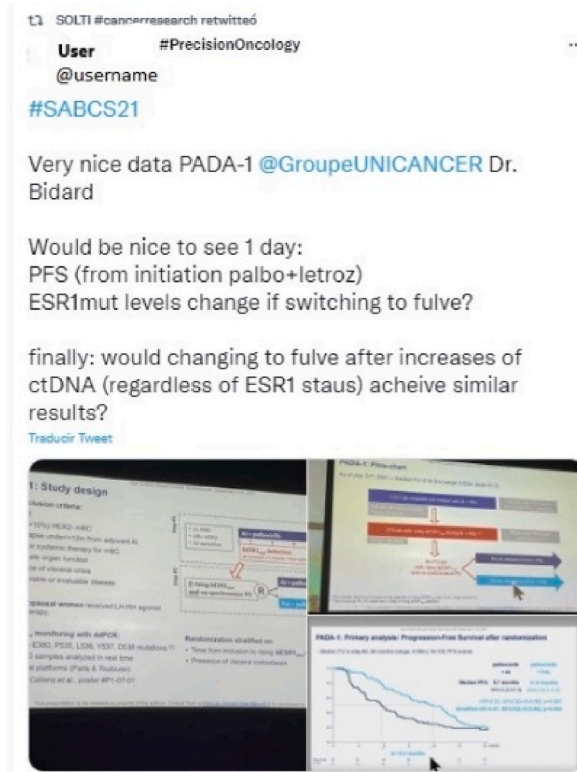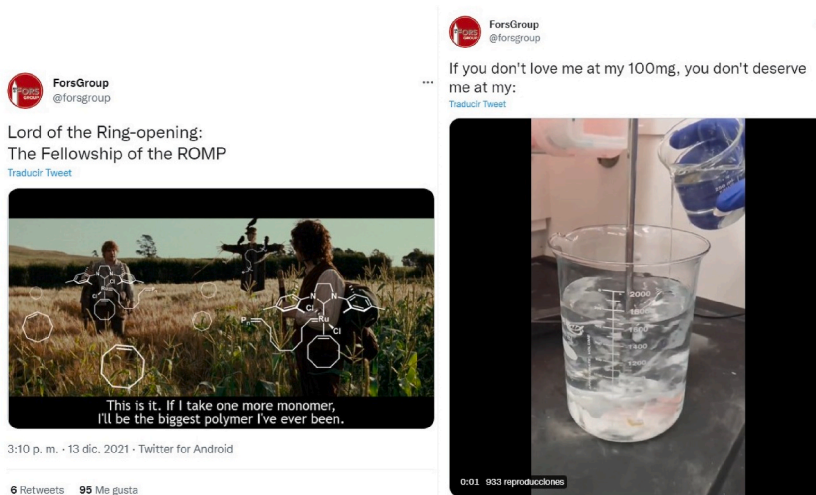

Fig. 9. Conference tweet with embedded conference slides (*@SOLTI*)

Fig. 10a. Tweet with a quote card from a research paper (*@MartinLab_ICIQ*)

Fig. 10b. Tweet with a quote card from an online guide (*@topic-group*)

a)   b)

Fig. 11. a and b. Tweets embedding memes (*@forsgroup*)

related to the group's research. The meme seems to have been successful in creating solidarity, as reflected in the number of retweets (n=6) and likes (n=95). Fig. 11b is another example of memes intended to create solidarity. The example is a variation of the meme "if you don't love me at my worst, you don't deserve me at my best". In this meme, the text is usually accompanied with two images: a bad one and a better counterpart. In Fig. 11b, the "worst" is represented by "100 mg" and the "best" by an image representing a bigger measure, thus adapting the meme to the discipline context. The humorous effect is difficult to appreciate for readers outside the disciplinary community, which helps to create solidarity.

5.4. Hyperlinking

Citation through hyperlinking (Priem & Costello, 2010; Weller et al., 2011) is an essential component of tweets composed by research groups, since the purpose of many of these tweets is to share research outcomes or useful online resources (Luzón & Pérez-Llantada, 2022). Most citations of scholarly publications are internal, that is, links to the group's newly published journal papers in tweets intended to promote these papers. Other types of texts incorporated to the tweet-text through hyperlinking play an important role in achieving the purpose(s) of the tweets, e.g newspaper articles or webpages with news of the group (promotional), reports and useful resources for the readers (see Fig. 5) (networking and dissemination), disciplinary news of interest to the community (networking), webpages where the reader can do something (call to action). Links are often combined with evaluative language and directives, intended to bring the linked text to the reader's attention. The link can be a URL, but also frequently a quote card or other types of visuals. In example 4 the link enables the writer to bypass the 280-character limit and extend the tweet with an online text. This tweet is the first is in a tweet-thread commenting on and evaluating a decision by the FDA (Food and Drug Administration). The URL in the tweet links to the FDA document ("FDA approves abemaciclib with endocrine therapy for early breast cancer"), which readers can access and read in order to understand the tweeter's comments in the following tweets in the thread.

(4) *SOLTI #cancerresearch retweeted*
     Aleix Prat #PrecisionOncology@prat_aleix·29 oct. 2021
     The recent @FDAOncology approval of abemaciclib in adjuvant HR+/HER2-breast cancer for patients with tumor's Ki67 > 20% is interesting for two reasons
     https://bit.ly/2XUYSpo @OncoAlert @EMA_News ⬇⬇⬇⬇ (@SOLTI)

5.5. Digital mentions: hashtags and @mentions

One of the techniques of intertextual representation identified by Bazerman (2004, p. 88) is the "mentioning of a person, document, or statement", without providing more details, which helps the writer to imply meanings by relying on "the reader's familiarity with the original source". This type of representation occurred scarcely in the dataset (see "Lord of the Ring-opening" in Fig. 11a). However, the corpus displayed a large number of digital mentions. The term "digital mention" is used in this paper to refer to the mentioning of other voices through digital resources, i.e. hashtags, @mentions (see example 5).

(5) For the 3rd of our #CoVideos, we spoke to @Cathy_Creswell and Yasmeen. They spoke about, @EmergingMindsUK helping young people and parents during the pandemic + the importance of #LivedExperience in mental health research. http://mentalhealthresearchmatters.org.uk/covideos, #MentalHealthResearchMatters (@topic_group)

Researchers have emphasized the intertextual function of hashtags. Bonilla and Rosa (2015, p. 5) note that hashtags "have the intertextual potential to link a broad range of tweets on a given topic or disparate topics as part of an intertextual chain" (2015, p. 5), and Zappavigna (2015, p. 289) claims that "hashtags signal the potential presence of other users in the social network". Zappavigna (2015) discusses how hashtags not only have an experiential (topic related) function, but also an interpersonal function (enacting interpersonal relationships) and a textual function (organizing text). In example 5 the hashtag #MentalHealthResearchMatters relates this tweet to all the other tweets with the same tag (intertextual function), but also serves to express the writer's stance (shared with the members of the hashtag community). Some tweets in the corpus included conferences hashtags, which enabled the user to link the tweet to other tweets related to the same conference and make it a part of the conference conversation (see "#SABCS21" in Fig. 8a). Hashtags were sometimes used to link tweets related to specific projects, or tweets that are part of a series in the Twitter feed, and signal their relation. This is the case, for instance, of the hashtag "#CoVideos" (example 5), or tweets such as "#MeettheMartinis" in the Twitter feed of the Martin group, which helps to connect the tweets used to introduce the members of the group. Finally, some tweets in the corpus also display multiple related hashtags (e.g. #SinCienciaNoHayFuturo #NoScienceNoFuture #SinCiencia-NonHaiFuturo), a practice which creates an intertextual link between several discussions in Twitter. All these uses of hashtags help the groups to improve the visibility and searchability of the tweets and in turn increase their own visibility and construct their identity.

@mentions are another digital intertextual device aiming at incorporating other voices in a tweet. @mentions had several overlapping functions in the corpus, among them referentiality (see "@EmergingMindsUK" in example 5) and addressivity, which facilitates further interaction with the mentioned user and signals social allegiances. As with hashtags, multiple mentions were displayed in a single tweet to build intertextual links between related Twitter accounts and related voices and increase visibility (e.g. @SEOM @1969carodriguez @_SOLTI @prat_aleix @BelletMeritxell @itsnot_pink @OncoAlert).

5.6. Template reuse

A frequent practice in the Twitter accounts analyzed, facilitated by the modularity affordance of digital texts, is the reuse of templates to compose tweets serving a specific purpose, e.g. introduce the members of the group. This was a common practice in the Twitter account of the Martin group and the TOPIC group (see Fig. 12) in tweets intended for group promotion. The use of the template facilitates the composing of the tweets, and creates intertextual links between the tweets created with the same template, helping the readers to identify them as providing the same type of content.

5.7. Function of intertextuality in research groups' tweets: a summary

Academics harness the affordances of tweets to refer to, link to or incorporate other texts and voices, and recontextualize them to fit the tweet's purpose. Intertextual representations in the tweets in the corpus analyzed served a variety of functions (see Table 2), which helped these groups accomplish several social actions: promoting the group and their research output, networking, community building and negotiating relations with their audiences, persuading readers to take specific actions, increasing the interested public's science literacy (in relation to their field of research), and constructing their identity (as competent researchers, members of a specific community).

Two productive intertextual practices which contribute to promoting the group involve retweeting. The first is retweeting tweets that inform of the group's research activity and outcomes, both tweets by group members (i.e. self-reposting) and by other internal or external sources, thus amplifying the audience. The second practice is retweeting others' positive evaluation of the group, which enables the group to validate and showcase their achievements while avoiding self-praise. Another promotional innovative practice is the use of tweet threads, where visual quotations and text summaries are combined, to present the main results of the group's conference presentations or publications. This can be considered a type of tweetorial (Graham, 2021) intended for experts. Other innovative intertextual practices served networking purposes, e.g. discipline-related memes to create intimacy and solidarity, retweeting to endorse others' opinions or to help other researchers spread their information, hashtags and @mentions to signal the group's affiliation to networked communities, maintain relationships and participate in conversations.

A large number of intertextual representations were clearly intended to publicize the research and achievements of the groups (see "promotion of the group" in Table 2), but it could be argued that all instances of intertextuality served to promote the groups and increase their visibility. As Page (2012) notes, Twitter is ideally suited to self-branding, and intertextuality is a useful resource to achieve this promotional purpose. For instance, by incorporating @mentions and hashtags and by informing or retweeting about others' research, groups not only promote others' work and strengthen their bonds with them but also increase the spreadability of their tweets, project their scholarly authority, and ultimately enhance their own visibility. Similarly, hyperlinks to discipline-related resources and news have a networking and dissemination purpose, but also serve to represent the tweeters as competent members of the community.

Intertextuality plays therefore an important role in the creation of the group's digital identity. The various possibilities for intertextuality in academic tweets enable the tweeters to incorporate a multiplicity of voices, e.g. of the members of the group, other researchers, academic organizations. The groups create their own voice and identity by appropriating these voices and adapting them to serve their own purposes, or as Bakhtin (1981) would put it, populating them with their own intentions. The groups in this study exploited intertextuality to provide cumulative information about their (members') academic interests, research and expertise, their academic allegiances and connections, their values and mission, and, in this way, they constructed a multifaceted group identity. The groups' intertextual practices (i.e. the texts and voices that each group chooses to incorporate or exclude in their tweets, how they are incorporated, and the group's stance about them) helps them to project particular identities (e.g. as competent researchers, as researchers involved in science dissemination).

6. Conclusions

In this paper I have explored the intertextual practices of research groups in their Twitter accounts. The academic tweets in the corpus are highly intertextual, often composed by incorporating or referring to a wide range of previous texts and voices. Academic tweets both reconfigure well-established forms of intertextuality, by adapting them to the Twitter environment, and display novel and innovative forms of intertextuality facilitated by the technological affordances: retweeting (and commenting on) tweets which are extracted from a previous Twitter conversation and incorporated into the group's Twitter feed for several purposes; embedding other digital elements (videos, pictures, graphical abstracts, memes), which may act as "appetizers" for the text from which they have been extracted or serve as means of expressing solidarity and creating community; linking to and connecting the tweet physically to other digital texts, creating a network through which the reader can navigate. The analysis has shown that the forms of intertextuality in academic tweets are influenced by the affordances and constraints of Twitter. The retweeting feature and the easiness with which elements from other online spaces can be copied-and-pasted or embedded facilitate new forms of quotations. Many tweets embed other artefacts (e.g. other tweets, graphical abstracts, short videos), with the purpose of harnessing the "reach" and "public" affordances of Twitter to amplify the audience of these texts. Hyperlinking makes it possible to incorporate other digital texts, turning the tweet into a platform for the distribution and sharing of texts with various audiences for different purposes. Digital mentions (hashtags and @mentions) refer to other tweets, simultaneously incorporating other voices to the tweet and connecting the tweet to a broader conversation.

The study has also revealed three features of intertextuality in this digital context. First, the intertextual representations in these
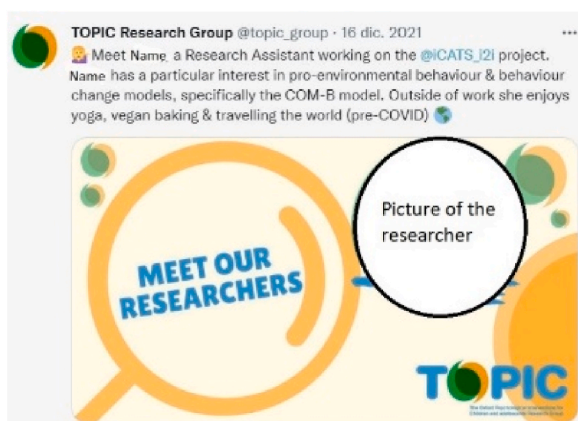
Fig. 12. Use of templates to compose tweets (*@topic-group*)

Table 2
Functions of the intertextual representations in academic tweets.

Social action	Functions of intertextuality	Form of intertextuality
Promotion of the group	Reposting the group's own messages to increase visibility	Retweeting
	Displaying others' positive evaluation of the group	Retweeting
	Presenting and summarizing the group's own research (new publication, conference presentation)	Written summary
		Embedded visual
	Citing (linking to) their publications	Hyperlinking
	Drawing attention to a hyperlinked text	Embedded visual
		Quote card
	Connecting tweets within the Twitter account	Hashtags
		Template reuse
Networking	Acknowledging other groups/researchers	Retweeting
	Spreading other's information and announcements	Retweeting
	Endorsing others' stance and opinions	Retweeting
	Establishing a dialogue with other researchers	Retweeting
	Sharing others' resources	Retweeting
	Referring to or summarizing others' work	Written summary
		Embedded visual
	Incorporating texts to be discussed or commented on	Embedded visual
		Hyperlinking
	Creating solidarity through humor	Memes
	Signaling affiliation to a community	Hashtags
	Engaging in a broader conversation	Hashtags
		@mentions
Call to action	Reposting tweets calling to action	Retweeting
Reaching wider audiences	Sharing the group's or others' resources	Retweeting
		Hyperlinking

tweets are usually multimodal: the semiotic resources that are taken up from previous contexts are not only written text, but very often visual resources or a combination of text and (audio)visual elements. Secondly, intertextuality very often merges with hypertextuality: most intertextual instances connect the text to previous texts not only discursively, but also physically, since the reader can click on the link, the retweet or the embedded element and traverse to another digital space. Thirdly, intertextuality in academic tweets is characterized by diversity, complexity and multi-layeredness. Many tweets in the corpus analyzed are a mosaic of other texts, which display several layers of retweeting and embedding, and multiplicity of intertextual relations, combined to achieve the communicative purpose(s) of the tweet. The possibility of incorporating a variety and multiplicity of intertextual representations in a single tweet is what makes tweets such effective tools to spread various types of information, with little text-producing effort, and achieve various purposes simultaneously.

The functional analysis of intertextuality in these academic tweets has also shown that the intertextual practices of academics when composing tweets are shaped by the communicative purposes of the tweets, that is, by the social actions that these tweets accomplish. The Twitter account of research groups is an open genre, always in the making, intended to spread content taken up from other digital (and non-digital) spaces, connect with other users and promote the group. This openness of academic Twitter and its potential for immediate real-time sharing helps academics to achieve the promotional, networking and outreach purposes of the genre, and to negotiate their identity and relationships to their social context. Interestingly, although some forms of intertextuality are common in the Twitter accounts of the four groups (e.g. retweeting, hyperlinking), not all the forms occur in the four datasets or are used with the

same functions. This is the case, for instance, of the use of tweet threads to summarize papers, the use of memes to create solidarity, or the use of retweets and hyperlinks to disseminate information to wider audiences. This suggests that these groups are creative in using intertextuality to meet their purposes and that individual agency and the group's specific purposes play an important role in shaping their intertextual practices.

It should be noted that this study is exploratory and limited in the number of tweets and disciplines in the corpus. Future research could examine intertextual practices in tweets composed by researchers in other disciplines. Another limitation of the study is that it is purely text-based, with the functional analysis of intertextuality relying on the analyst's interpretation. In future research, this analysis could be complemented with discourse-based semi-structured interviews with the tweeters in order to get information about their perception regarding the purpose of the intertextual instances they incorporate in their tweets and corroborate the analyst's interpretation.

Despite these limitations, this study has important implications for EAP instruction and for the teaching of digital genres for academic communication. Due to its public nature and its potential to include a variety of intertextualities, Twitter constitutes a unique arena where groups can interact with others to spread their own and others' content and share them within their discipline and with wider audiences. The key role of intertextuality in achieving the social purposes of academic tweets suggests that an important skill in meaning making in these tweets is the ability to skillfully adapt and recontextualize various semiotic elements in previous texts. Thus, EAP instruction could include activities that involve digital multimodal composing (see Hafner & Miller, 2019) and recontextualization of academic content, where learners need to exploit the affordances of the genre being composed to accomplish specific social actions. Since academic tweets exhibit considerable variability, it seems appropriate to teach them as choice, by focusing on their affordances and rhetorical purposes, so that, as Devitt (2004) claims, genre awareness can lead to individual creativity. This study can therefore be used to help scholars (and research groups in particular) become aware of the multiple ways in which intertextuality can be harnessed to compose effective tweets in order to achieve specific purposes. More generally, the results of this study can also help to raise awareness of intertextuality in traditional research genres, by engaging learners in exploring the similarities and differences between intertextual practices in social media and print-based genres. Comparing the choices available regarding the forms and functions of intertextuality in these genres, with an emphasis on how authors integrate previous texts to achieve their own rhetorical purposes, could help learners gain a better understanding of intertextuality and voice in academic writing.

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