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Early career researchers and PhD students from the social sciences use of Social Networking Sites (SNS) for science communication: an affordances approach

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ABSTRACT

This research aims to understand the different practices and strategies early career researchers and PhD students from the social sciences have in Social Networking Sites (SNSs) for science communication in one particular country: Brazil. Following this purpose, the central research question is which are the motives and rationale of the researchers for using social networking sites for science communication. Two sub-questions arise from this general research question: How do practices and strategies relate to the academic system of this country? And How do the traditional science communication practices translate into the use of Social Networking Sites (SNS)? This research is empirically oriented building up on case studies in Brazil. This study makes use of the adaptation that Van Dijck (2013) made of the Actor-Network Theory (ANT) and the review of affordances of social media platforms (Bucher & Helmond, 2016) to apply it to the study of social media as the theoretical approach. The methodological approach of this research is qualitative, using both interviews and netnography as research methods.

The primary motivations for using different Social Networking Sites are all related to connectivity: communication with peers, to the public and research subjects, updating themselves about their research issue, dissemination of research, availability of papers, self-branding and participation in interest groups are the most mentioned. These motivations translate into cross-posting practices and integrated communication strategies -combining online and offline elements- on the different Social Networking Sites. These motivations translate into perceived affordances all related to social affordances, therefore, social capital processes: availability, scalability, visibility and multimediality. The academic system of the country has remained unchanged as it privileges traditional scholarly academic formats; therefore, early career researchers and PhD students from the social sciences only use the different Social Networking Sites (SNS) as a side aid but not as a primary means of communication. Social media is underused as a means of public science communication, even though these platforms offer a lot of advantages for pursuing such issue. Traditional science communication practices translate into the use of Social Networking Sites (SNSs). The most important issue that came out in this report was the fact that social affordances provided by Social Networking (SNSs) are still required to be endorsed by real life meeting to start further collaboration and the fact that English is the preferred language for such issues.

Keywords: Social Networking Sites; Brazil; Early career social science researchers; social sciences PhD students; science communication; scholarly communication; Affordances; ANT

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1. INTRODUCTION

Social Networking Sites offer tools for communication, collaboration and diffusion of research outputs. Many scholars are taking advantage of these sites with the purpose of science communication to network and communicate their findings. This study contributes by documenting the practices early career researchers from the social sciences have in a vast country from the global south, Brazil. These practices relate to other researchers -peers- and by doing so constructing an online identity but also to the public. The institutional system and their incentives of the country intertwine with the early career social sciences researchers' practices, in other words, it is a multifactorial phenomenon.

Like many other individuals around the world, academics and researchers build their online identities through personal branding (Duffy & Pooley, 2017). However, this promotional and networking labour also demands time and energy. Besides the fact that the usage of social media is blurring the limits of what constitutes the public and the private life of the individual and making this relationship even more complicated. At the very same time, the negotiation for setting up boundaries between public and private life can be complicated "particularly when someone is motivated to publicise something that is seemingly private or when technology complicates people's ability to control access and visibility" (Boyd, 2010, p. 52).

Another point related to this subject is that in the latter years, academia has entered into a series of changes at a global scale. For instance, Veletsianos (2016) argues that due to the technological advancement, a parallel system to educational institutions has appeared online. Some other people even claim that universities as institutions will eventually disappear in a not so distant future (Roberts, 2017). Science communication, and especially public science communication -as divulgation of science- is really important for researchers in public universities for making a case about their work still being relevant to society and for getting access to taxpayers' money. This issue is also increasingly relevant for people working in the –soft sciences- humanities and social sciences fields.

For this research, Brazil was chosen as this country has more research outputs and also more investment in Research and Development (R&D) in the Latin American region (Van Noorden, 2014). Therefore, more researchers work in universities and research institutes within this country. The recent cuts in funding for education and research in this country (Modzeleski, Tenente & Fajardo, 2017) -and many others in the region- make the case of science communication even more timely.

1.2 Research question

This research aims to understand the different practices and strategies early career researchers and PhD students from the social sciences have in Social Networking Sites (SNSs) for science communication in one particular country: Brazil.

Following this purpose, the central research question is which are the motives and rationale of the researchers for using social networking sites for science communication. Obviously, these motives and rationale are not independent characteristics, but rather they are interrelated with the academic environment in which early career researchers and PhD students work and study. Therefore, two sub-questions arise from this general research question: How do practices and strategies relate to the academic system of this country? and

How do the traditional science communication practices translate into the use of Social Networking Sites (SNSs)?

This research is empirically oriented building up on case studies in Brazil. This study makes use of the adaptation that Van Dijck (2013) made of the Actor-Network Theory (ANT) and the review of affordances of social media platforms (Bucher & Helmond, 2016) to apply it to the study of social media as the theoretical approach.

1.3 Relevance and contribution to the field

This study is relevant since it provides an analysis of social networking sites use and academic system. Moreover, this study contributes to the discussion of the use of social media but it focuses on a specific public which has not been previously explored: early career researchers and PhD students from the social sciences from a country located in the global south.

Overall, since this study is focused in one country: Brazil. It addresses the critical gap in the literature about science communication in the global south since this field subject has been traditionally understudied; therefore, this research aims to contribute to this area of science since it is very much needed for solving problems related to several needs in these countries (Guenther & Joubert, 2017; Gastrow, 2015)

1.4 Disposition

This thesis is organized according to the following scheme. A general background comes in the second section; this general background is divided into three sections: an overview of the Brazilian academic system, then it presents the concepts of public science communication and scholarly communication. The third section introduces the literature review on the researcher's use of the different social networking sites. The fourth section provides the theoretical background, followed by the methodology used in this work in the fifth section. Then, the results and their discussion are presented. Subsequently, a conclusion is provided.

2. BACKGROUND

Firstly, this background section presents a brief overview of the Brazilian system; Secondly, an overview of the concept of science communication, meaning communication of scholars to the public; Thirdly, an overview of the idea of scholarly communication, involving the interaction of researchers with their peers.

2.1 Brazilian system

This section provides a general overlook within the university and rewards systems in Brazil. Brazilian education system is very complex (Sobrinho & De Brito, 2008). Sao Paulo concentrates a quarter of students and half of research outputs of the whole country, while the northern regions show major problems in quantitative and qualitative terms of educational supply and scientific production (Sobrinho & De Brito, 2008). Likewise, the Brazilian international presence is around 1.8 % of the world's total. However, it is around half of the total regional production. These research outputs come from a few research universities (Schwartzman & Balbachevsky, 2014).

The tertiary education system has 257 public institutions and 2141 private institutions. These two kinds of institutions could be subdivided between universities, university centres, and colleges. Research production in universities is mandatory, but it is not in the other two types of institutions (Sobrinho & De Brito, 2008). The incentives from the national authorities make believe academics should have a PhD degree and actively engaged in research (Schwartzman & Balbachevsky, 2014). National resources usually support science in Brazil;

nevertheless, researchers with international contacts can get more resources from abroad. (Schwartzman & Balbachevsky, 2014).

To apply for national funding, researchers must update their online profile in the Lattes platform. The Lattes Platform is the biggest online CV database created by the National Council for Science and Technology (CNPq); to have an updated CV on this platform is a requirement for applying for grants and fellowships from the CNPq (Massarani & Peters, 2016: 1166). The number of CVs of people holding a PhD in the Lattes Platform is close to 119,402 (Massarani & Peters, 2016, p. 1166).

2.2 Communication to the public and the peers

This section provides on the concepts of scholars' communication to the public and interactions of researchers with their own peers. Both types of communication had been traditionally studied as different phenomena, namely as public science communication and scholarly communication; however, this thesis combines these two concepts since that through the use of various social media platforms both types of communication are now intertwined. Moreover, the idea of networked scholarship is defined by Veletsianos (2016) as "scholar's use of social technologies and online social networks to pursue, share, reflect upon, critique, improve, validate and further their scholarship". This concept involves both science communication and scholarly communication and it is embedded in the university system.

Public communication of science emerges as a way of institutionalization of the research sector and the growth and spread of the mass media. Moreover, there is a discourse of science and scientific activity as progressive and beneficial to society (Bucchi, 2008).

The traditional conception involves a paternalistic view of science communication. Bucchi (2008, p. 58) argues that this traditional view of science communication entails "the public's inability to understand and appreciate the achievements of science due to prejudicial public hostility as well as to misrepresentation by the mass media". The traditional conception of public science communication adopts "a linear, pedagogical view of communication to argue that the quantity and quality of the public communication of science should be improved" (Bucchi, 2008, p. 58). This traditional diffusionist theory sees people as mere receivers of information "whose default ignorance and hostility to science can be counteracted by appropriate injection of science communication" (Bucchi, 2008, p. 58). In this case, the

science communication process starts with the specialist and finishes in the popular discourse in a single way.

Notwithstanding, yet another theory in public science communication presents a dialogic option where there is a crucial shift from "the education of a scientifically illiterate public" to the need and right of the public to participate in the discussion" (Bucchi, 2008, p. 68). This approach to science divulgation enables interaction between the specialist and the popular discourse. Moreover, this concept highlights "seeing communication not simply as a cause – for instance, of changes in opinions and attitudes among the public, due to the transfer of particular results or ideas – but also as the result of developments in both discourses, allowing the formation of an intersection zone" (Bucchi, 2008, p. 67). This model is also aligned with changes in science as related to the shift from the "very notion of a sharp distinction between producers and users of knowledge, which rests on the basis of a diffusionist, deficit, transfer vision of science communication" (Bucchi, 2008, p. 68).

Academics do not engage in public science communication because the university systems do not reward them for doing so, but rather researchers in universities prefer to prioritise scholarly communication through academic journals and scientific conferences. The result of this situation is that science communication to the general public is regarded as less important, often seen as an optional or fruitless activity (Ndlovu, Joubert & Boshoff, 2016, p. 16). Moreover, another reason for this lack of interest in public science communication is that researchers think that there is little public science literacy, especially when communicating results in the hard sciences (Ndlovu, Joubert & Boshoff, 2016).

Communication with peers -namely scholarly communication- is made through different platforms such as monographs, journals and conference presentations. It is defined as "process of sharing, disseminating and publishing research findings of academics and researchers so that the generated academic contents are made available to the global academic communities" (UNESCO, 2015, p. 6).

Nonetheless, apart from these formal channels, informal communication with peers also occurs. Furthermore, the concept of informal scholarly communication includes a lot of sub concepts as well. For instance, one of them is the idea of the invisible college. An invisible college includes the idea of a formal or informal communication network of scholars from the same specialisation and research interests which may or may not share the same institutional affiliation or may even be in a distant location from within each other. The ties within this network are high, so researchers within this invisible college produce research outputs or

propose projects relevant to this research subject, organise meetings, share papers or reprints (Zuccala, 2005).

Zuccala (2005) decomposes the invisible college concept into three layers: subject speciality, social actors and information use environment. The subject speciality is the disciplinary rules and research problems properly from the speciality. Scientists are the social actors involved in these circles whose objective is to keep up to date with the latest developments in their speciality. The Information Use Environment (IUE) is designed to enhance the deliberation of ideas, this sort of environment could be located in a physical space or a digital platform.

People within this invisible college may also interact with weak ties outside this network. Nonetheless, this interaction with weak ties most likely does not generate new opportunities for collaboration in internet discussion groups (Zuccala, 2005). This lack of possibilities in cooperation with weak ties also coincides with the findings of Wagner (2008) who argues that virtual links are better for researchers who have already worked face to face and use these platforms to cooperate virtually.

As a result, there is an interconnection between the traditional academic practices and new technologies through a negotiation process and is also quite complicated indeed. In other words, networked scholarship "challenges academic norms and scholar's participation in networked spaces introduces complexities" (Veletsianos, 2016). Overall, apparently there has been an ideological shift from the "established frameworks of academic scholarship and discourse" towards a more participatory -allowing discussion and reflection- and empowering structure with social media (Veletsianos, 2016). Additionally, Veletsianos (2016) affirms that networked scholarship relates to openness as it refers to the idea that scholarly resources -as common goods- should have open licensing policies so that other users can use these resources.

This complex environment allows scholars to "adapt and appropriate social media to fulfill personal and professional desires and values"; therefore researchers "have the agency to accept or reject any particular technology or to find alternative uses for it that will better serve their needs" (Veletsianos, 2016). It is evident then that scholars can make strategic uses of social media regarding their practices. However, in order to take advantage of this strategic uses, "individuals need to develop a new set of competencies that include skills such as appropriation, transmedia navigation, and networking" (Veletsianos, 2016). The context of the academic usage of social media depends on the incentives system of the institutions. However, as the institutional policies for tenure and promotion are still the same (on overall,

they have remained unchanged), academic incentives for participating and communicating their work through those channels are rather low (Veletsianos, 2016).

Furthermore, Veletsianos (2016) proposes two terms that refer to users of social media in an academic context: digital residents and digital visitors. Digital residents refer to the "scholars who understand the affordances of the participatory web for scholarship, cultivate digital identities and relationships online and view the web as a crucial component of their scholarly work and identity". While digital visitors are "scholars who use the web as a tool when they see a need for it". Networked scholarship - populated by both digital residents and digital visitors- is obviously a new concept however, it will be interesting to find out whether the systems in which these networked scholars work have also changed.

3. LITERATURE REVIEW: RESEARCHER'S USE OF SOCIAL NETWORKING SITES

This section reviews the literature on social media usage by academics. This review starts with literature on general researcher's usage of social media. It latter moves to literature on researcher's usage of specific social networking sites –platforms such as Facebook and Twitter- and later moves on to academic social media –platforms such as ResearchGate and Academia.edu-, as the latter began to appear following a chronological order. The motivation for choosing these specific platforms is that these sites were mentioned throughout the interviews and provide an understanding on how they are used by different researchers and the different implications of this use.

There is a general impression that social media has facilitated researchers to communicate their work (Van Eperen & Marincola, 2011). Academic networking sites have a significant potential for communication and cooperation among scientists (Nentwich & König, 2014). Researchers are now using collaboration through social media while cooperation among users in the research field is crucial (Martorell & Canet, 2013).

The active usage of this kind of social media could also lead to social diversification of academia, and eventually, the democratisation of science as these platforms provide the infrastructure for networking and informal communication within and outside the academic community (Work, et al., 2015). Another identified benefit is the increase of international collaboration and interdisciplinary, which ultimately may lead to a higher impact (Work, et al., 2015). Moreover, Martorell & Canet (2013) argue that there is a change in the research mentality, going from "me" to "us" that is a more collaborative and open approach to research. Researchers' primary motivations for using social media are 1) People were externally driven, that is they were invited by colleagues or a project or institutional demand; 2) People were interested in self-development so they can acquire or keep up to date with new information; 3) People used social media for maintaining or strengthening existing connections; 4) People used social media for searching and making new contacts (Donelan,

2016). Moreover, researchers who engage in an integrated online communication strategy across different platforms "tend also to have a wider range of motivations for using them, and experience a greater number of successful outcomes" (Donelan, 2016, p. 727).

Although social media could be a channel to communicate research outputs to -theoretically - the whole world, few researchers engage with this kind of online tools for active collaboration and dissemination of science (Collins, Shiffman & Rock, 2016). This could be due to the fact that scientists overall recognize social media platforms as not serious ways of communication that could eventually damage ongoing studies (Van Eperen and Marincola, 2011). Further reasons are the diffusion of academic social media is low (Nentwich & König, 2014) or those active users of these kinds of platforms are usually young researchers i.e. early career researchers (Murphy & Lewis, 2015). People sometimes are unmotivated to interact and collaborate with strangers in social media since they prefer to communicate and focus on real people around them (Boyd, 2010).

The main barriers preventing researchers to a more widespread use of social networking sites are related to a series of issues such as: negative perceptions of social media; not seeing these sites as an efficient use of time; lack of skills about how to use these tools; lack of confidence in generating content to be communicated through social media; lack of interest in using these sites for work related aims, or some concerns about safety and privacy (Donelan, 2016, p.722).

Researchers do use general social media networks –such as Twitter, Facebook- in a vast majority (Collins, Shiffman & Rock, 2016). Nonetheless, each platform has a particular favourite use. Facebook is preferred for personal communication –with friends and family mostly- as few individuals thought of this platform as a valid form of science communication. Conversely, Ndlovu, Joubert & Boshoff (2016), whose work studies a particular country: Zimbabwe, arrived to significantly different results. These authors surveyed on science communication and found out that most scientists still preferred traditional academic platforms for communication, such as conferences (73%) or seminars (69%). Only a small proportion used digital media, which was mostly referred to blogs (14%).

On a local level, most Brazilians researchers do not engage in public science communication through social media. Despite the fact that most scientists are active users in some social networking sites, they usually use these sites for other reasons, such as to keep contact with friends or relatives; to keep themselves informed about general issues such as political or public topics; or to keep themselves informed about "issues related to science in their expertise area" or to communicate with fellow scientists (Massarani & Peters, 2016, p. 1170).

3.1 Facebook

Researchers use this platform mainly through two ways: by creating a public page specifically for science communication issues; the second way is primarily using Facebook for private issues, such as communicating with friends and family (Bik & Goldstein, 2013).

Most research concurs on the fact that general social media -platforms such as Facebook or Twitter- usage is apparently sharply different to academic social media. For instance, even though scholars have a Facebook account, this account is mostly used for personal communication and within family and friends (Collins, Shiffman & Rock, 2016). Most users believed this social network was not "a valid form of science communication" (Collins, Shiffman & Rock, 2016, p. 5). Furthermore, according to Work, et al. (2015) everybody uses Facebook but in a rather private context, not in an academic setting. Therefore, Facebook is perceived as the go-to platform to connect more with colleagues or contacts already known in real life rather than trying to establish new connections. Moreover, Facebook constitute one of the most used platforms for informal scholarly communication, along with Twitter and Google+ (Al-Auf & Fulton, 2014).

Further research about Facebook in higher education is mostly focused on Facebook as an aid or complement in the teaching process, especially among tertiary students and professors. As a result of Facebook being a platform that offers a collaborative environment, i.e. a virtual learning platform which enhances debates and tutoring practices (Esquivel-Gámez & Rojas-Kramer, 2014; Tuñez-López & Sixto García, 2012). Or as Facebook as an educational resource for collaborative learning (Olivares-Campos, 2015).

There are many Facebook users in Brazil and in Latin America in general. The penetration rate of Facebook in LATAM is constantly growing (Statista, 2017) and so is the case in

Brazil (eMarketer, 2017). As there are lots of active users on this platform, it is very useful to reach people quickly in an academic environment.

3.2 Twitter

According to Work, et al. (2015, p. 51) Twitter is the "most promising social media channel to engage directly with an interested public beyond the closed scientific community". Nonetheless, this social media platform usage seems to be a new trend as many researchers have created their own accounts on this platform within the last two years (Collins, Shiffman & Rock, 2016).

Differing to the Facebook usage, Twitter seems to be more helpful for science communication. Collins, Shiffman & Rock (2016, p. 5) found out that researchers tweet about new research within their own field. Furthermore, Twitter is preferred for communicating with peers (Collins, Shiffman & Rock, 2016). These new connections Twitter can help to achieve relatively easily give the researcher a sense of being part of a global community i.e. achieved through global connections within a particular time frame. These key points stood out as main reasons on why researchers started using this social media platform for professional usage (Budge, Lemon, & McPherson, 2016).

Another usage is within scientific conferences with a given hashtag of this conference. This usage helps to keep cohesion within the conversation at real time while the speakers are still presenting and also for further reflection after the meeting has occurred. Other academics use Twitter as a way to share their research to the public or media, in other words as science outreach and public science communication. Finally, other reasons for Twitter constant usage is personal research, or to research something outside their own field and to share their personal life.

The sense of non-hierarchical structure in Twitter – on the contrary, academia which clearly has a hierarchical nature – is seen as a stimulating environment and makes the possibilities to contact and connect with people who previously may have difficult access to due to hierarchical reasons such as senior academics. In this sense, "more fluid connections are possible via Twitter and break down some of the visible and invisible barriers between" (Budge, Lemon, & McPherson, 2016, p. 217). Building upon this type of environment, researchers can develop a professional identity and academic connections within this social networking site (Budge, Lemon, & McPherson, 2016).

3.3 Other platforms: YouTube & WhatsApp

WhatsApp as a communication platform in a professional niche has been studied between physicians and healthcare professionals mostly. This particular use within a single community is due to its ability to transfer clinical images to a specific person (the patient) or group of colleagues instantly, which is a highly valuable asset in emergency or surgery consultations (Gulacti, 2016; Arunagiri & Anbalagan, 2016; Sidhoum, 2017). In other words, WhatsApp is popular because it is extremely fast to transmit texts and pictures (Anderson, 2016).

YouTube as a channel of science communication has also been explored. Welbourne & Grant (2015) researched about science communication channels on YouTube; however professional communicators and not scientists themselves maintained most of the channels in their study. The study by Welbourne & Grant (2015) argues that professionally generated content does not lead automatically to more popularity than user-generated science communication channels even though the professionally generated content has more financial resources or is created by professional. This fact is due to content consumers preferring information from trusted sources and that longer videos seem less popular than shorter ones (Welbourne & Grant, 2015). Another point that stands out in this study is the gender gap in the content creation. There are more male science communicators than female counterparts "despite having the same technical skills and feeling just as much a part of the YouTube community as their male counterparts " (Welbourne & Grant, 2015, p. 715).

3.4 ResearchGate

ResearchGate is one of the most popular academic social networks. Van Noorden (2014) argues that ResearchGate is quite popular while Academia.edu seems less well known than the former. About 24% of publications are available at a full-text level in this platform (Jamali, 2017). The ResearchGate platform currently reflects the academic hierarchies since according to the research carried out by Thelwall & Kousha (2015) there is a correlation between the impact points of this platforms and five major academic ranking systems.

The majority of researchers are present in some of the different academic social media platforms (Campos-Freire & Rúas-Araújo, 2016). However, this is related mostly to a basic use such as uploading files or including affiliation and merits information. Campos-Freire &

Rúas-Araújo (2016) observe certain scepticism on the usefulness of academic social networks due to the small number of visits to papers and also a low number of updates.

Even though that in ResearchGate users can create profiles, upload research outputs –such as papers or grey literature-, connect with other users and also there is a function for an open review, which works as an online version of the traditional peer review panel (Ortega, 2016). Or even use a forum for Question & Answers (Q&A) where platform users can ask technical, methodological or conceptual queries and the scientific community can answer them (Ortega, 2016, p. 122). Researchers use these online social networks to try to increase their research outputs visibility and follow other scientists in their field; however, it is not their intention to grow citations rate through these platforms or establish new contacts for collaboration or communication (Campos-Freire & Rúas-Araújo, 2016).

Furthermore, ResearchGate presents metrics for each paper uploaded to the platform. Ortega (2016) classifies these metrics into three categories: bibliometric indicators, usage and connectivity measurements. The bibliometric indicators are the "RG Score, Impact Points, Citations and Publications are addressed to measure the scientific impact and production of each profile" (Ortega, 2016, p. 103). The RG score counts the "contributions that each user makes to the system and the perception in the community of his or her contributions" (Ortega, 2016, p. 104). In other words, ResearchGate has a reputation score such as RGScore and this score focuses on the researcher. Basically, it is generated through conversation and interaction in the platform (Gonzalez-Diaz, Iglesias-Garcia, & Codina, 2015). The Impact points indicator "measures the research impact of the profiles according to the journals that publish their works" (Ortega, 2016, p. 105). Finally, Citations and publications metrics come only from the papers uploaded in the platform and is basically "an indicator of productivity and is related to the ability of a researcher to create scientific content" (Ortega, 2016, p.105-107).

Notwithstanding the platform provides a lot of utilities, disadvantages on the usage of such academic networking sites have been pointed out. In one hand, for instance, people could use them to upload copyrighted research outputs (Van Noorden, 2014). Most (78.3%) of the full-text articles available in the platform are actually some sorts of published version of which the majority (51.3%) is non-compliant copyrighted items (Jamali, 2017). On the other hand, authors would prefer to upload content to these sites instead of loading a copy in their institutional repositories (Björk, 2016).

3.5 Academia.edu

Academic social media produce interactions between researchers; however, it is still blurry how these social media platforms provide beneficial engagement (Van Noorden, 2014). For instance, on a local level, academic social media is still not so yet known in Spain, or people who know about these networks do not see a real utility; therefore, researchers do not keep an updated profile (Gonzalez-Diaz, Iglesias-Garcia, & Codina, 2015).

Academia.edu is the academic networking sites that have more users, most likely not only scholars but also professionals who take advantage of the resources available on the platform (Ortega, 2016). Academia.edu has four main elements: profiles, documents, research interests and organisations (Ortega, 2016, p.127) which interact to create engagement in the platform. The amount of engagement –and therefore the amount of usage- depends on a great deal on how many peers who are also active users of the platform. Most profiles in Academia.edu come from users from the social sciences, and the humanities (Ortega, 2016) and these researchers use their account at Academia.edu- at least once a week (Donelan, 2016).

As in the case of ResearchGate, the Academia.edu platform also reflects the academic hierarchies and scholarly norms mainly due to the fact that faculty profiles get much more views than student profiles (Thelwall & Kousha, 2014). In consequence, the visibility affordance is one of the key features in Academia.edu. The main public of this social network site is authors –who upload documents- and readers –who read and download PDFs. This visibility allows authors to gain more attention that could be converted into citations (Duffy & Pooley, 2017). In this regard, the main appeal for authors is visibility, so that authors can get more citations. Consequently, Academia.edu promises authors to boost their profile by generating and counting reader's engagement with their own work, which could be translated into future citations (Duffy & Pooley, 2017).

The focus on visibility emphasises the focus on analytics. This social network site has established an algorithm "using one audience (authors) to grow the other (readers), who in turn (if unintentionally) join the author ranks" (Duffy & Pooley, 2017, p.5). This situation occurs, even though authors do not update their profile too often (Donelan, 2016).

There is a quantification of production that leads users to self-monitoring using the analytics feature (Duffy & Pooley, 2017, p.6). This metrical tracking analytics feature is sort of an inheritor from the traditional indexes. The biggest difference is that this academic social media platform is overwhelmingly public since researchers by signing up and sustaining a profile "broadcast their intellectual status, as measured by the site's array of quantified reputation proxies" (Duffy & Pooley, 2017, p.6).

3.6 Mendeley

The primary focus of document sharing services –such as Mendeley or Zotero- is the research production of their own users since the platform provides an area where users can "freely put at the disposal of the network's members the results of their studies" (Ortega, 2016, p. 101). Moreover, document sharing services have provided an alternative publishing method, especially important in the case of grey literature such as technical reports, datasets, etc. Furthermore, with these types of services users can value and access the trail of their research outputs within this platform (Ortega, 2016). However not so frequently, since Mendeley users check their account around once a month (Jeng, He & Jiang, 2015); typically, users within this platforms are usually early career researchers (Jeng, He & Jiang, 2015).

Document-sharing services also provide some features that would be considered as social media such as the interest groups. These services that combine reference management and social networking have not yet "achieved the establishment of a compact and dynamic social community" (Ortega 2016, p. 96). For instance, researchers usually use Mendeley as a document management or as a reference management tool rather than as a social networking site i.e. managing existing friends or making more connections (Jeng, He & Jiang, 2015, p. 896-897). Moreover, according to Jeng, He & Jiang (2015, p. 898) the main motivations for joining Mendeley groups are: keeping up with the research domain, following topics that community is paying attention to and connecting with people who have similar research interests but not socialising.

4. THEORETICAL FRAMEWORK

This research will use two theories to analyse the result. The Actor-Network Theory will be employed as it quickly gives context to the relationships between actors in the platforms and the Affordances theory will be used to analyse the particular practices of the scholars in the platforms. The next sections present both theories and their applications in social media research. The final point in this theoretical framework part relates to the application of this conceptual framework in this specific research question.

4.1 Actor-Network Theory

This theory (ANT) aims to describe and analyse associations between humans and technological objects (Baron & Gomez, 2016). Actor-Network Theory (ANT) addresses the understanding "the interactions between social and technological phenomena, as well as the process of production of collective knowledge" (Baron & Gomez, 2016, p.129) while providing a starting point for addressing the different complex relations between humans and nonhumans elements (Sayes, 2014).
Actor-Network Theory provides a framework where associations between human agents and non-human agents interact. It pretends not to differentiate between human and non-human agents (Sayes, 2014). This theory also studies the social practices and analyses the “symbolic, practical and technological dimensions of human and technological associations" (Baron & Gomez, 2016, p.145).

ANT gives an active role to non-humans while starting the analysis from group formation processes preceding social constructions (Baron & Gomez, 2016). Non-humans elements cannot be considered as neutral mediators in networks since they eventually -and silently- modify the relationships between other agents (Baron & Gomez, 2016). A non-human agent

can add something to the relationships, interactions or associations within agents. This "something" is conceptualised as mediation within Actor-Network Theory (Sayes, 2014, p. 138). As such, nonhumans are mediators which themselves bear their own meaning and affect social relationships (Gourlay, 2015).

4.2 Actor-Network Theory in Social Networking Sites

This research departs from the framework of the Actor-Network Theory, as the different platforms early career social sciences researchers at universities use for science communication are socio-technical constructions which mediate between the various actors. Therefore, the technological aspect of social networking sites has now agency by itself.

Mainly, it builds upon the interpretation Van Dijck (2012) gives to this theory in order to apply it to social media. Within this framework, the aim of the Actor-Network Theory (ANT) is to "map relations between technologies and people, and tries to explain how these relations are both material and semiotic" (Van Dijck, 2012, p.150). According to Van Dijck (2012, p.150), social media platforms are constructs that are "built to create and mediate a new type of social capital: connectivity". Therefore, this research will focus study the usage of early career social sciences researchers of social media, in order to see if their connectivity has changed with the active use of these networks in relation to traditional ways of scientific communication.

The agency that Van Dijck (2012) highlights in ANT has different changes according to their use. For instance, people and non-human elements such as algorithms have agency. These algorithms shape people's behaviours in the different platforms (Van Dijck, 2012). This relation between the agency from human and non-human elements allows the creation of an interdependent and flexible process and this process is in constant reconfiguration (invention, development, acceptance, implementation, resistance and rejection) (Van Dijck, 2012, p. 151). In this particular case, connectivity is enhanced by the social media platforms used by the researchers, its protocols and the participation included in the content shared on the platforms by the academics. In other words, the usage made by the human agents but also the technical agents such as algorithms are fundamental for the connectivity capital of the platform.

The usage of ANT as a theoretical framework in a social media context allows researchers "to trace the flow of becoming of a heterogeneous assemblage, enabled to afford a particular action" while following the actors on "on scene, and trace mobile agents that represented their intra-actions" and at the same time "understanding affordances as a collective accomplishment of diverse actors, some co-present physically and others co-present while at a distance" (Sharma, Saha & Sarkar, 2016, p. 74).

Using Actor-Network Theory in Social Networking Sites offers a model which explores three major players who "create the fabric on online sociality" (Van Dijck, 2013): platform, user agency and content. A platform is a mediator which shapes the performance of social acts; the user agency, which allows the user to have agency and control their own actions in the platform while being a producer and a consumer of content; and finally, the content, which is the fundamental element of Social Networking Sites. Each social media platform can be looked as a microsystem, while all platforms combined to form an ecosystem of connective media in which social and cultural norms follow the system but simultaneously this system is enhanced by them (Van Dijck, 2013).

4.3 Affordances Theory

An affordance is an object's perceived utility, i.e. a property appropriate for people's daily life communication (Gaver, 1991). When an affordance is present, the perceptible affordances occur when there is "perceptual information available for an existing affordance", on the other hand, the hidden affordances "must be inferred from other evidence" (Gaver, 1991). Perceptible affordances offer a "direct link between perception and action" while hidden and false affordances lead to mistakes in the perceptions (Gaver, 1991).

Affordances focused in technology relates to the utility perceived in a certain object (Wagner, Vollmar & Wagner, 2014). Focusing on affordances is a way of studying the way people use the different possibilities technologies offer (Gaver, 1991). Affordances are constructed in a dialogical relationship between people and technology (Sharma, Saha & Sarkar, 2016). However, like any other concept in the social sciences, the perception of affordances is determined up to a great measure on people's background such as culture, social relations,

experience and intentions (Gaver, 1991); in other words, it depends on the person subjectivity.

4.4 Affordances Theory in Social Networking Sites

Affordances theory is an important theory in the field of media studies (Bucher & Helmond, 2016). There is a dialogic relationship between social media and people: people choose them to use them because of their functionalities, but at the same time, these very same features frame and shape peoples' activities (Sharma, Saha & Sarkar, 2016, p. 73). This very same relationship between humans – users with human agency- and the materiality of technology – such as technological functions and algorithms- relates to the creation and actualization of social media affordances (Sharma, Saha & Sarkar, 2016, p. 74). Therefore, affordances occur at "multiple level and across platform boundaries" (Bucher & Helmond, 2016, p. 15). These new affordances "can shape publics and how people negotiate them" (Boyd, 2010, p. 45-46) however, these affordances "do not determine social practice".

When talking about networking publics, Boyd (2010) argues the introduction of technology has shaped the way people engage with these environments. Social media introduce new affordances mainly regarding the amplification and spreading of information. For Boyd (2010, p. 46), there are four main affordances emerging form social media: persistence, replicability, scalability and searchability. The persistence affordance allows expressions and communications to remain recorded and accessible though the net; though the replicability affordance the content duplicated; with the scalability, affordance content can be visible to scores of people (in this case, publics), other words, the ability to scale the contents so they can be seen by large numbers of people; and though the searchability affordance content can be searched in the net.

Communicative practices change though the use of high-level affordance (Bucher & Helmond, 2016). Communicative affordances are defined as "an interaction between subjective perceptions of utility and objective qualities of the technology that alter communicative practices" (Schrock, 2015, p.1238). Within communicative affordances, three main affordances are distinguished: availability, locatability and multimediality.

The availability affordance "can be thought of as a combination of multiplexity (where different types of media coexist simultaneously), direct contact with individuals, and increased frequency of communications though various locations" (Schrock, 2015, p.1237). In other words, the availability affordance as defined by Schrock (2015) is a combination of different media coexisting at the same time, with the direct contact with people and expanded the frequency of communications through various locations.

The locatability affordance is related to the availability of the sites, mainly defined by geographical coordinates, but also "they now acquire dynamic meaning as a consequence of the constantly changing location-based information that is attached to them" (Schrock, 2015, p.1237). The multimediality affordance refers to the ability to use different types of media – such as integration with audio or pictures, i.e. visual or audio-visual content- in the communicative practices (Schrock, 2015, p.1238).

The term social affordances refer to the "possibilities that technological changes afford for social relations and social structure" (Bucher & Helmond, 2016, p. 9). More specifically, this type of affordances looks at "specific features of the network to understand social capital processes" (Bucher & Helmond, 2016, p. 13). The concept of social capital was defined by Bourdieu as the real or potential resources coming from the fact of being part of a network; these resources are elicited through social interaction and exchange or resource petitions within this network. Resources available to people largely depends on their position within the social network and how do they communicate with this network (Ellison & Vitak, 2015). In this context, social capital derives from interactions with the user's network. Thus, the constant use of social networking sites is associated with perceived benefits and accumulation of social capital resources as the constant use of different social networking sites and especially with cross posting practices and various interactions within the user's network generates an accumulation of social capital resources (Ellison & Vitak, 2015).

The affordance of association is related to the social affordances. The association affordance seeks to establish "connections between individuals, between individuals and content, or between an actor and a presentation; enable users to make visible their social networks" (Wagner, Vollmar & Wagner, 2014, p. 35). There are two types of associations in a social media environment: the first is of a person features –i.e. a social tie – and the second type of

association made is from a person to a particular piece of information (Treem & Leonardi, 2012). Moreover, the association affordance facilitates befriending friends of friends in social networking sites, since users can "meet" friends on common friends' status updates (Ellison & Vitak, 2015).

The visibility affordance refers to the people's effort in locating a piece of information (Treem & Leonardi, 2012) or types of information or actions that are made visible (Treem & Leonardi, 2012). Moreover, this type of affordance allows people to see other content about or from someone else; Furthermore, people – and their knowledge located in a digital environment- becomes visible employing using the different platforms (Treem & Leonardi, 2012). Therefore, the visibility of different kinds of work is afforded by the different social media platforms.

Furthermore, Social Networking Sites allow users to connect with latent ties; then, friends of friends are now available and visible due to their position in the platforms; by doing so latent ties convert into weak ties instead (Ellison & Vitak, 2015). Moreover, social credentials become visible through the affordances of association and visibility. Social credentials are resources coming from social ties and their acceptance in the network relationships (Ellison & Vitak, 2015).

Finally, there are some technology affordances, which can also apply to social networking sites since these platforms can afford new types of behaviours regarding knowledge creation processes (Wagner, Vollmar & Wagner, 2014). The main affordances related to knowledge creation encountered by Wagner, Vollmar & Wagner (2014, p. 40-41) are linked to the socialisation process. This process is achieved through the affordances of association and reviewability; Furthermore, an externalisation process is executed though the affordances of authoring and editability; while, "the combination is supported by the affordances of editability and recombinability; and internalization is supported by the affordances of reviewability and experimentation" (Wagner, Vollmar & Wagner, 2014, p. 40-41).

4.5 Actor-Network Theory (ANT) and Affordances Theory in relation to this case

ANT and affordances theory in combination can give a much more complete approach to an individual subject since both approaches can provide a relationally and multi-layered approach. Bucher & Helmond (2016) argue affordances theory basically emphasise what technology does to users- but an analysis that goes both ways -what technology does to users but at the same time what user do with and to technology- is much more complete (Bucher & Helmond, 2016). In this sense, agency moves both ways "to the environment and to the observer" (Bucher & Helmond, 2016, p. 15). There is also a cross-posting practice in between social media platforms (Bucher & Helmond, 2016, p. 23). It is this cross-posting practice which allows connectivity to move "beyond the boundaries of the platform and takes the larger environment the platform operates in into account" (Bucher & Helmond, 2016, p. 26).

Connectivity in this research is defined as both an affordance and as type of social capital promoted and provided by Social Networking Sites. The main research question of this research is which are the researcher's practices in social networking sites for science communication, therefore Actor-Network Theory will be useful to analyse the different characteristics of the platforms ecosystem and affordances theory will be helpful to find out the main affordances perceived by researchers in these very same platforms.

5. METHODOLOGY

What this research aims to explore is how early career social sciences researchers use social networking sites for science communication in Brazil. Therefore, the main question proposed for this investigation is which are the motives and rationale of the scientists for using social networking sites for science communication. Two sub-questions arise from this research question: How do these motives relate to their practices and the academic system of this country? And which are the main affordances perceived by researchers?

This research uses an exploratory design since the aim is to examine is how researchers use social networking sites. An exploratory design does not generate hypothesis since it is applied in a context that has not been studied previously or that has few studies on the subject, therefore the primary goal is to gain insights on the specific subject i.e. gain information on the issue (Streb, 2010). The methodological approach of this proposed investigation is qualitative. Each case is a unit on which variables are measured. Therefore, each case has different agents with interactions and engagement with the different platforms.

The instruments used in this research were both structured interviews and netnography. In one hand, interviews provided detailed data on what people think about science communication and how they perceive social media platforms and why -or why not- they use these platforms for such end. These instruments also provided a broad understanding on the main affordances researchers see in each platform and how do they use those in accordance with their institutional framework. On the hand, netnography data provided information that may have been overlooked by the interviews respondents as in a conscious response. This type of data provided an in-depth understanding of community interactions between different

platform users. This instrument also provided a low bias -since data was not elicited- as the information is available naturally in the different platforms.

The selection of researchers was made using the snowball sampling technique. This type of sampling is executed by identifying "cases of interest from sampling people who know people who know people who know what cases are information rich, that is, good examples for study" (Patton, 2002, p. 243). This method of sampling will be ideal to use because "there is no available sampling frame listing all the elements for the population of interest" ("snowballing technique", 2014). Since I already had some contacts studying and working in this country, I proceed to ask these contacts for another reference or references, especially for fellow PhD students or early career scientists who are active users of different social media platforms.

The first part of the research has been carried out with structured interviews of a sample of early-career social sciences researchers. This series of synchronous online interviews were conducted via Skype videoconferencing and calls and in one case using the call feature of the Slack platform. Luckily enough almost none of the videoconferencing and calls provided any obstacle such as dropped calls or inaudible segments and this particular research subject is not that sensitive enough so that participants may be reluctant to share intimate information though a Skype call (Seitz, 2016).

The interviewed individuals were seven early career researchers or PhD students from different fields within the social sciences such as Information sciences, Education, Anthropology and Law. The age of the interviewees ranges from 25 to 45 years old. The respondents came mainly from three research universities and a higher institution from Brazil: *Universidade de Brasília, Universidade Federal do Ceará, Universidade Federal do Rio de Janeiro and the Instituto Federal de Rondônia*. The interviews were carried out in English, Portuguese and Spanish language depending on the interviewee preference, the different extracts translations available in this paper were done by myself. The complete description of the interviewed early career social science researchers and PhD students is available in Table 1 in the next page.

The interview started with a general information part and then it moved on to general questions about science dissemination and then specific questions about the use of Social

Networking Sites (SNS) for this specific end. The full interview guide is accessible in the annex section 9.1.

Table 1: Interviewees information

Person	**University**	**Academic status**	**Field**	**Age range**	**Gender**
J	Universidade de Brasília, (UnB)	PhD student	Information Sciences	40-45	M
R	Universidade Federal do Ceará (UFC)	Associate researcher	Education	35-40	F
L	Instituto Federal de Rondônia (IFRO) Campus Ji-Paraná	Associate professor	Anthropology	40-45	F
V	Universidade Federal do Rio de Janeiro (UFRJ)	PhD student	Information Sciences	30-35	F

D	Universidade de Brasília (UnB)	PhD student	Law	20-25	F
M	Universidade de Brasília, (UnB)	PhD student	Information Sciences	25-30	F
C	Universidade de Brasília, (UnB)	PhD student	Anthropology	25-30	F

The second part of the research was carried out using netnography, which for this case was used as an additional tool rather than an exclusive research method (Davies, 2007). Netnography (Kozinets, 2016) aims to constitute as a research method using Internet, social media and community interactions as main information sources and a profound researcher commitment. Netnography data contains interactions, participation, heterogeneity, and most importantly, different participants (Kozinets, 2015). In this particular case, interpretations are built upon non-elicited netnography data rather than elicited data (Kozinets, Dolbec & Earley, 2014). The netnography part focuses on the participation in the active social media accounts of the selected social science researchers in the period from January to June 2017. Each participant active social media account information is available in Table 2. In this research, netnography was used as a backup data source to the interviews. To proceed with the netnography, there were a series of phases followed: 1) the particular accounts of the researchers were located; 2) non-participant observation on these different accounts in both content and interactions was performed; 3) coding and categories construction was made in the same software and the same file as in the interviews.

Table 2: Interviewees' active social media accounts

Person	Facebook	Twitter	ResearchGate	Academia.edu	Mendeley	Youtube	WhatsApp
J	x	-	x	x	-	x	-
R	x	x	-	-	x	-	-
L	x	-	-	-	-	-	x
V	x	x	x	x	-	-	-
D	x	-	x	x	-	-	-
M	x	-	x	x	-	-	-
C	-	-	x	x	-	-	-

Data analysis was made using Dedoose. Dedoose is a web application for qualitative or mixed methods analysis. The coding process started reading the interviews and the netnography and then assigning codes to each extract following an open coding process, which eventually leads to the creation of conceptual categories. In other words, the results of the analysis of text content were codes. The initial codes emerged of the themes seem in the extracts, two examples of this initial stage can be seen in Figure 1:

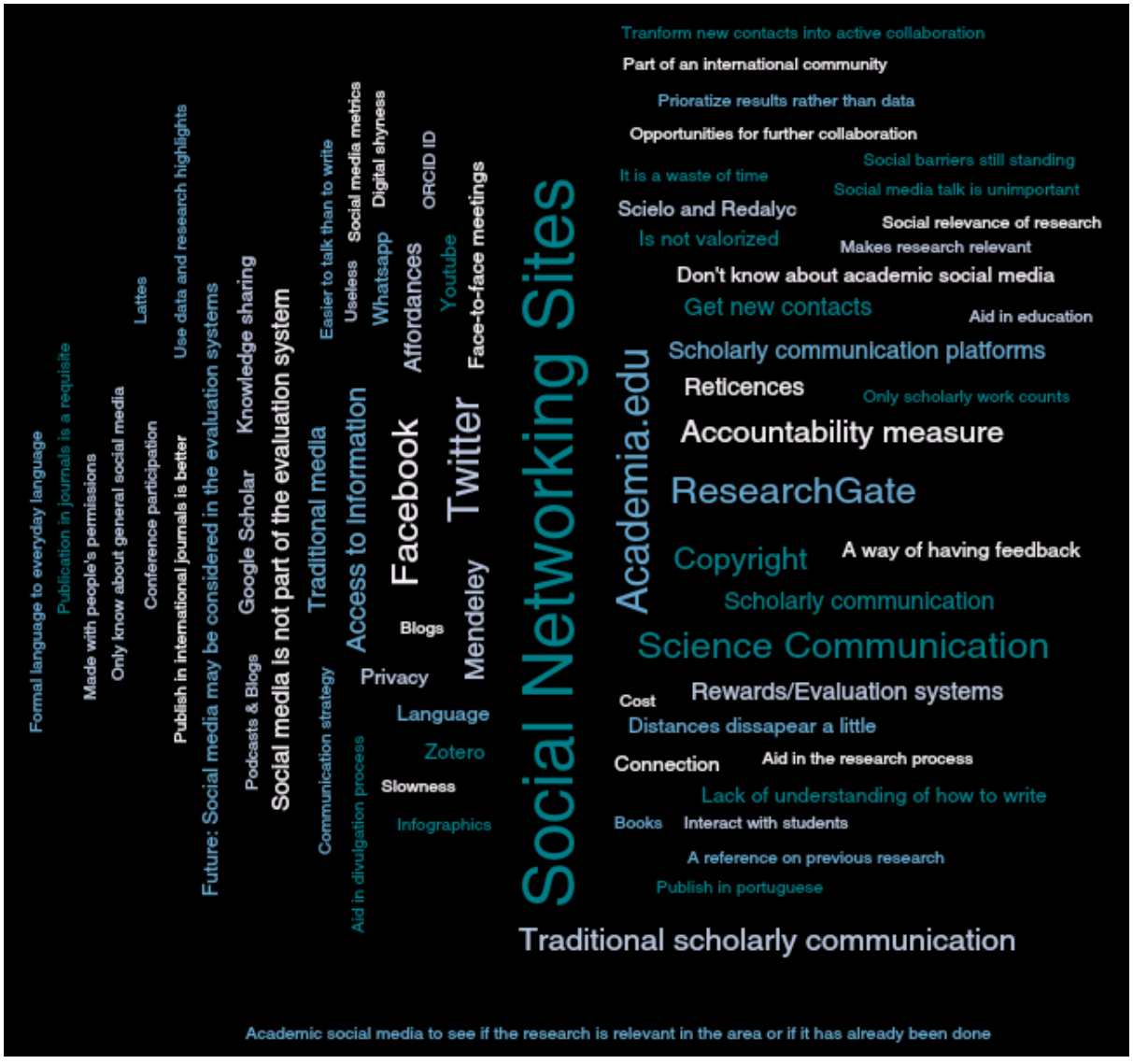
Figure 1: Codes for data analysis in Dedoose

After completing this first process I proceed to create conceptual categories built upon from these initial codes. The larger categories are seen in Figure 2:

Figure 2: Categories for data analysis in Dedoose

The cloud of codes and categories used in this research is available in Figure 3. In this figure, the codes that repeat the most in the data are larger than those which do not have a lot of repetitions. The full list of codes and categories is available the annex section 9.2.

Figure 3: Cloud of codes and categories for data analysis in Dedoose



5.1 Methodological reflections

As the social sciences as such emerged after the natural sciences, many scholars argue it should follow the successful model of the hard sciences in a sense it uses different kinds of variables to understand and predict future phenomena and search for laws. With this prospect in mind, Flyvbjerg (2005) argues that social sciences should not follow the epistemic model from the natural sciences, but rather to follow a model this author calls phronetic social science. Phronetic social science aims "to understand values and interests and how they relate to praxis" (Flyvbjerg, 2005, p. 40), in other words, this author argues for a problem driven type of science with political and social relevance. A social science for and in practice - concrete empirical analyses and practical philosophical-ethical considerations- which eventually provides "to society's capacity for value-rational deliberation and action" is something what Flyvbjerg (2005, p. 42) argues for with this term.

Following this lead, this research aims to contribute with something useful in society in an area that has been understudied so far. The approach of this work is, after all, a problem driven social research with an explorative design. As such, it uses qualitative methodology which aims to provide an understanding of how scientists use social media for science communication. Here, the main intention is rather to understand these strategies, not trying to make predictions on these particular social sciences events.

As for objectivity, the approach this work follows is situated objectivity. This ideal developed by Ward (1997) argues that "constructive voice of culturally and historically situated knowledge interpreters and discursively constituted subjects" rather than a neutral voice. The process of knowledge construction under this ideal of objectivity then is actually intertwined with politics, social and cultural representation in a given time and place. Most importantly, knowledge construction is seen as "the result of an individual's political position within society" (Ward, 1997, p. 780).

This specific approach to objectivity in digital media studies is, of course, related to a way of working when researching about the landscape. One valid reason for this could be due to the fact that the digital media platforms are more less the same for each user everywhere around the world –i.e. Facebook, Twitter, etc.- therefore users reflect their daily live and social relations and make use of the platform simulating real life in different situated contexts.

The answers provided by the researchers may differ up to a certain degree if someone else will be conducting the interview. Nonetheless, this project provides the explanation on how the data was earned and how the data coding was constructed, which is by pointing out the categories of data analysis (Hancké, 2009). Netnography data is easier to replicate since, as in the case of newspapers and other printed materials, this information is publicly available in the different social networking sites. Finally, in this specific instance, the data will be triangulated with specific interviews and netnography data -which contains supporting materials available on the social media sites.

5.2 Limitations

On limitations, the sampling technique of snowballing obviously does not provide a random sample of researchers since it is non-probability sampling method. However, it was a useful way of mapping researchers that are already in a real social network since this study's main focus is after all is about connectivity in its different forms. Another limitation may be related to the fact that the interviews and the netnography were limited to early careers researchers who are more likely to be proficient internet users so this will probably have an effect in the ICTs usage and social media usage overall. Finally another limitation is related to the fact that this study uses an explorative design and a small sample size, therefore it cannot reveal findings generalizable to the whole population.

5.3 Ethics

All participants were aware of the research and its aims. When interviewing them, I asked them whether they would want to remain anonymous or state their names in the final report. Moreover, this research does not deal with any minority or underage people, researchers in different societies around the world are not a marginal group but rather a part of the academic field, which is a rather important field as developed by Bourdieu fields theory.

6. ANALYSIS AND DISCUSSION

This research aims to understand the different practices and strategies early career researchers and PhD students from the social sciences have in Social Networking Sites (SNSs) for science communication in one particular country, Brazil. To complete this aim, this thesis analyses and discusses the results of this research using the theoretical framework in this section. This section starts with a general overlook on what early career researchers think about science communication. Later it analyses how researchers use social networking sites for science communication using an affordances approach. This section ends with an overview of what early career social sciences researchers think about the disruptive nature of social networking sites and some perspective in regards of the academic culture.

Science communication is an important issue in the eyes of early career researchers from the social sciences. It is primarily an activity to receive feedback from the public but also as an accountability measure, i.e. a way of giving back to the public. However, the role of public science communication is diminished in the evaluation systems of universities and research centres due to the fact that these evaluation systems focus mainly research outputs. Public science communication is not as rewarded as academic production in academic journals or conference participation.

Academic production is the most important thing measured in competition for professorships and fellowships, which is a highly important matter in an early career researcher and PhD students from any discipline. This measurement leads to a high pressure to publish papers in many journals that are recognised as valuable according to the university or the national evaluation systems.

There is a consensus on the idea of science and overall scientific activity as beneficial to society (Bucchi, 2008). In this case, literally, all the interviewees agreed that science

communication is an important subject for society. Science communication makes researchers make sense about the relevance of the specific research they are carrying out and to have feedback on the project itself as it allows enriching the project, while doing so it may also opening doors for collaboration. Researchers also think that the sole activity of doing research implies also communicating it in a bidirectional way so that the researcher receives feedback from the audience. This dialogue leads to innovation in the research subject. In consequence, early career researchers from the social sciences follow a dialogic approach to science communication as the public can participate in the discussion. This dialogic approach represents a shift from the previous idea about the clear distinction between producers of producers of science -researchers and scientists- and receivers of science -the public- i.e. the transfer vision of science communication (Bucchi, 2008).

Science communication is also perceived as an accountability measure. In the cases where researchers studied in a public university and in the cases where they have received funding for projects with taxpayer's money. In these cases, science divulgation is perceived as a way of giving back to the public so they can see in a tangible manner what they have financed with their very own contributions. As one researcher (V., personal communication, May 24, 2017) puts it:

> "*For me it is a matter of responsibility because I have always been financed by the government. I have studied in a public university without paying anything, receiving funding to study, then I think it is important that the public know what they are paying for*".

Most early career social science researchers are not used to the idea of public science communication, especially since they prefer to use the traditional channels for scholarly communication, which are eventually highly regarded in the evaluation system. "*Dissemination is not as valued as academic production*" (L., personal communication, February 28, 2017). Overall the opinion is that science distribution –to the public- is not as valuable as academic production since "*professors use traditional channels and traditional knowledge networks*" (R., personal communication, February 17, 2017). These opinions concur to those found in the study of Ndlovu, Joubert & Boshoff (2016) where researchers did not actively engage in science dissemination because this type of outreach is not rewarded in the university system. This lack of rewards entails that most researchers preferred

traditional academic journals and scientific conferences than the different forms of science communication to the public, as the latter is perceived only as an optional activity.

Research production is mandatory in universities (Sobrinho & De Brito, 2008) and people in the academic career have incentives when engaged in research (Schwartzman & Balbachevsky, 2014). This mandatoriness is of particular importance since this type of researchers are in the early stages of their career and need different kinds of research outputs recognized in the university system in case they would want to apply to more permanent positions at research universities. This unchangeability in the incentives system of the institutions concurs with the results provided by Veletsianos (2016) where he specifies that requirements for tenure and promotion have remained uninterrupted so far.

Traditional scholarly communication forms for scientific communication is still preferred in the evaluation systems of the universities. Moreover, this type of communication is a mandatory requisite for the evaluation systems. As one researcher argues:

> "*The academic production is much more valued, for example in a public contest to enter as a university professor what counts in the curriculum are not the publications of dissemination, to the public; Only recognised scientific outputs count*" (L., personal communication, February 28, 2017).

This evaluation system is equally valid for PhD students, as one argues:

> "*It is mandatory to publish at least two publications in two impact journals suggested by the postgraduate system that we have here, this is an obligation in the contract*" (J., personal communication, February 17, 2017).

In this regard, for this particular case there is hardly any challenge to the academic norms of traditional scholarly communication, contrary to what Veletsianos (2016) who argues on scholars' participation in networked spaces and introducing innovations in the system are causing challenges in the academic norms. Therefore, the approach in this case is much more conventional.

The few researchers who engage in public science communication either use traditional media such as divulgation articles or interviews or social media such as blog articles. Hence, traditional media and new media coexist within public science communication as in a mix of channels: Podcasts and blogs are the preferred new media, but people also talk on the radio or TV interviews or write for divulgation magazines. Depending on the subject of research

traditional media focuses more or less on the subject. For instance, public science communication about indigenous people in the Amazonian region is important and relevant in society, so journalists call researchers to talk about it on TV and radio.

The same phenomena observed by Collins, Shiffman & Rock (2016) and Massarani & Peters (2016) exist in these cases. Few researchers engage with social media for the specific use of science communication (science divulgation), they mostly use these platforms for other types of communication: mostly to be in contact with colleagues and to keep themselves informed about academia and their research area, i.e. informal scholarly communication and participation in invisible colleges.

The different Social Networking Sites provide a complex ecosystem where different agents interact, negotiate and provide connectivity from within each other. Affordances theory allows knowing how researchers use the different platforms and the many motives and rationale behind this use of social networking sites. The following sections are organized following the order of this table and review with more detail each of the actions afforded by each platform stated in Table 3. By doing so the central research question of this research is addressed. In the following table, a synthesis of the main affordances perceived and mentioned by early career social science researchers interviewed for this research is found.

Table 3: Affordances perceived by each platform

Affordance	**Platform**	**Motivation**
Connectivity	Twitter	Communication with peers
		Updating
		Participation in conferences
		Multilingualism
	Facebook	Interest groups
	Academia.edu & ResearchGate	Dissemination of research
		Upload and download files
		Updating: though the alert systems
Social affordances	Academia.edu & ResearchGate	Communication with peers
		Contacting new peers
		Identification of prospective contacts
		Looking for prospective collaboration

		Self-branding
		Follow/ Following
	Twitter	Follow/ Following
	WhatsApp	Interest groups
		Communication with peers
		Communication with research subjects
Availability	Academia.edu & ResearchGate	Communication within users
		Ask and download files
		Communication to the public
Scalability	Academia.edu & ResearchGate	Communication within users
		Use of metrics
Visibility	Academia.edu & ResearchGate	Upload files
		Dissemination of research
		Research their own interests
		Subscribe to research interest
	Mendeley	Interest groups
		Communication to the public
Multimediality	Youtube	Dissemination of research
		Communication to the public
	Facebook	Links to scholarly platforms
	Academia.edu & ResearchGate	Dissemination of research
		Cross posting practices
		Connection with scholarly platforms

6.1 Connectivity across platforms and networks

The concept of networked scholarship as provided by Veletsianos (2016) refers to the use of social networking sites and other online technologies to "pursue, share, reflect upon, critique, improve, validate and further their scholarship". Researchers try to use social media as a mean to connect with other colleagues and with the public as well.

The usage of social networking sites for communication changes accordingly the particular scientific field of the researcher and the affordances the researchers see -or fails to see- on each platform. In these specific cases, we see there are early career researchers that are digital

residents and other who are digital visitors (Veletsianos, 2016). For instance, people who research technologies in education or scholarly communication are of course very proficient users of social media and in general ICTs due to their study field. These participants are digital residents since they participate and network across different platforms and cultivate a digital identity on these very same platforms (Veletsianos, 2016). Yet other researchers, who could be classified as digital visitors since they use the different social media platforms only when they see fit, some are not even aware academic social networking sites exist.

Many relationships are emerging under social networking sites usage for science communication by early career social science researchers. According to some researchers, social media has made academia more horizontal as people have faster access to contact other people in an informal manner, since social media provides the infrastructure to do so as Work, et al. (2015) argue. Feedback and answers are shared instantly. Also, achieving collaboration is easier than before due to the faster contact: the distance between people is blurring. For instance, a researcher argues:

> "*Social media has made Academia more horizontal as well so you have faster access, for example, you can give them feedback instantly and ask them questions they may or may not answer you but that doesn't mean it's worse than before it's actually better because you do have that possibility before you didn't*" (R., personal communication, February 17, 2017).

Social Networking Sites and other types of connective media create a large ecosystem which interacts with traditional media (Van Dijck, 2013). The traditional media in scholarly communication are journal articles, conferences presentation; therefore, social media also platforms also interact with digital platforms carrying such resources. This is closely related to the multimediality affordance since different types of media interact.

Evaluation systems at Brazilian universities and research centres are stratified and consider most certainly scholarly communication platforms. This system gives different punctuation to various roles such as author, editor, a member of an editorial board, participation in conferences and workshops. The evaluation system per se is composed of some variables in a scale. This scale does not count social media usage, therefore just as Veletsianos (2016) describes, the incentives for researchers to communicate their work though these channels are rather small in this specific country. Social media metrics are not in any way translated into the evaluation system of institutions, so the connectivity of these platforms is not yet included

in these systems. It is under consideration the fact that universities include a more straightforward way of measuring social media impact.

Books are not high up in the punctuation scale but journal articles are in the field of education. However, books launches generate a lot of buzz in social media and this eventually may lead to more research projects. At the same time, there is no representation on this scale of social relevance. Many groups in Brazil are trying to redo this punctuation scale so it can take into account the social significance of the research. Moreover, researchers argue that it is important to know about the social relevance of the research while keep producing and keep having an impact on a determine research field.

There is no official part in the evaluation system for social media usage. As one researcher argues:

> "*The situation is that social media metrics are not in any way translated into the evaluation system but because the work you build is all related from the time you get a book launch and an article published it translates indirectly. The metrics translate only indirectly into the career, they are very much needed but they are translated indirectly. I do say it's time that universities have a more straightforward way of measuring social media impact, for example, our National Database of academic curriculum Lattes has integrated social media but only for blog posts so there's a section in our academic curriculum*" (R., personal communication, February 17, 2017).

So far, there have been some changes, for instance the Brazil's National Database of Research, Curriculum Lattes has integrated social media but only for blog posts, so there's a section in the academic curriculum. In this regard, the incorporation of blog posts is a step forward because then in the future the university community can start thinking about doing that for the tenure track production. Therefore, the first step is social media visibility and then the second phase will be measuring in it up in the system.

6.1.1 Platform, user agency and content

With this background, it is only logical that early career researchers and PhD students concentrate on producing more scholarly research outputs and use the different social media platforms as a way to converse with peers, gaining more information about their research topic and try a marketing approach of themselves and their work.

In the next pages, the different platforms are analysed according to the model constructed by Van Dijck (2013) in which the elements of technology, user agency and content create the framework of online sociality and though which connectivity is afforded but at the same time elicited.

Under the view of Van Dijck (2013), Social Network Sites are not just intermediaries but rather are mediators since these very own platforms shape the depiction of social acts. When analysing the platforms, there is a clear separate the general social networking sites such as Facebook and Twitter apart from the academic networking sites.

Some of these academic platform condition access to other papers to the upload of the researcher's own publications; in consequence, researchers are eager to share their own publications and interests. This situation is a clear case of non-human agency (Van Dijck, 2013) since it is under the structure and programming of the platform to ask for papers in order to be able to download other papers. As a means of self-feeding the article database available on the platform.

The user and his or her agency is another central actor in this analysis since "the power of users to control their actions is an important stake" (Van Dijck, 2013). The platform usage is inscribed mainly by two types of participation: implicit participation and explicit participation.

There are many examples of implicit participation in academic social networking sites. The usage is inscribed in the coding and design of the platform and forces the user to the adoption of alert systems or upload documents so the researcher can download other documents.

The alert system provides the latest documents uploaded in the platform about the research subjects relevant to the person's interests. As one researcher puts it:

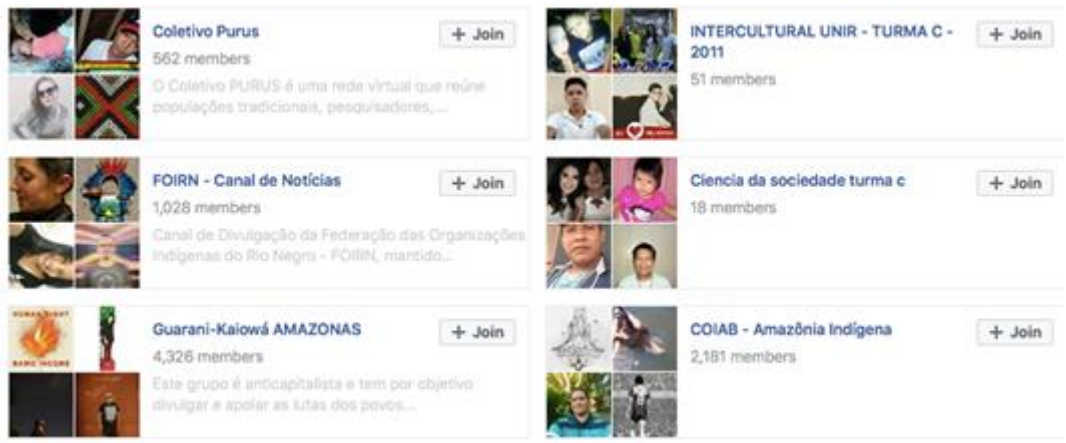
> "*I also subscribe to the alerts systems of them pointed out my interests in such a way that I can receive alerts of new publications about the issues that interest me. What I use most of these networks are precisely the alert systems*" (J., personal communication, February 17, 2017).

This point is related to the visibility affordance since that without the alert systems people would not be able to see other new papers.

Since explicit participation in platforms refers to the interaction between people and social media (Van Dijck, 2013), in this subsection this thesis will look into four platforms: Facebook, Twitter, Academia.edu and ResearchGate.

Researchers use different features of the Facebook platform within their profession. For instance, Facebook is favoured for building their interests groups, which serve as a specialised forum. Interests groups in Facebook are used to talk to people who share similar interests. These Facebook groups involve people in the country –or neighbouring countries – working in this specific area and the communication within these groups is in the local language: Portuguese. For instance, a researcher whose area of research is about indigenous people in the Amazonian part of Brazil is part of a variety of interest groups related to this (Figure 4):

Figure 4: Facebook groups about indigenous peoples from the Amazonia



And a PhD student whose area of research is scholarly communication –within Information Sciences- is part of different interest groups related to this (Figure 5):

Figure 5: Facebook groups about scholarly communication

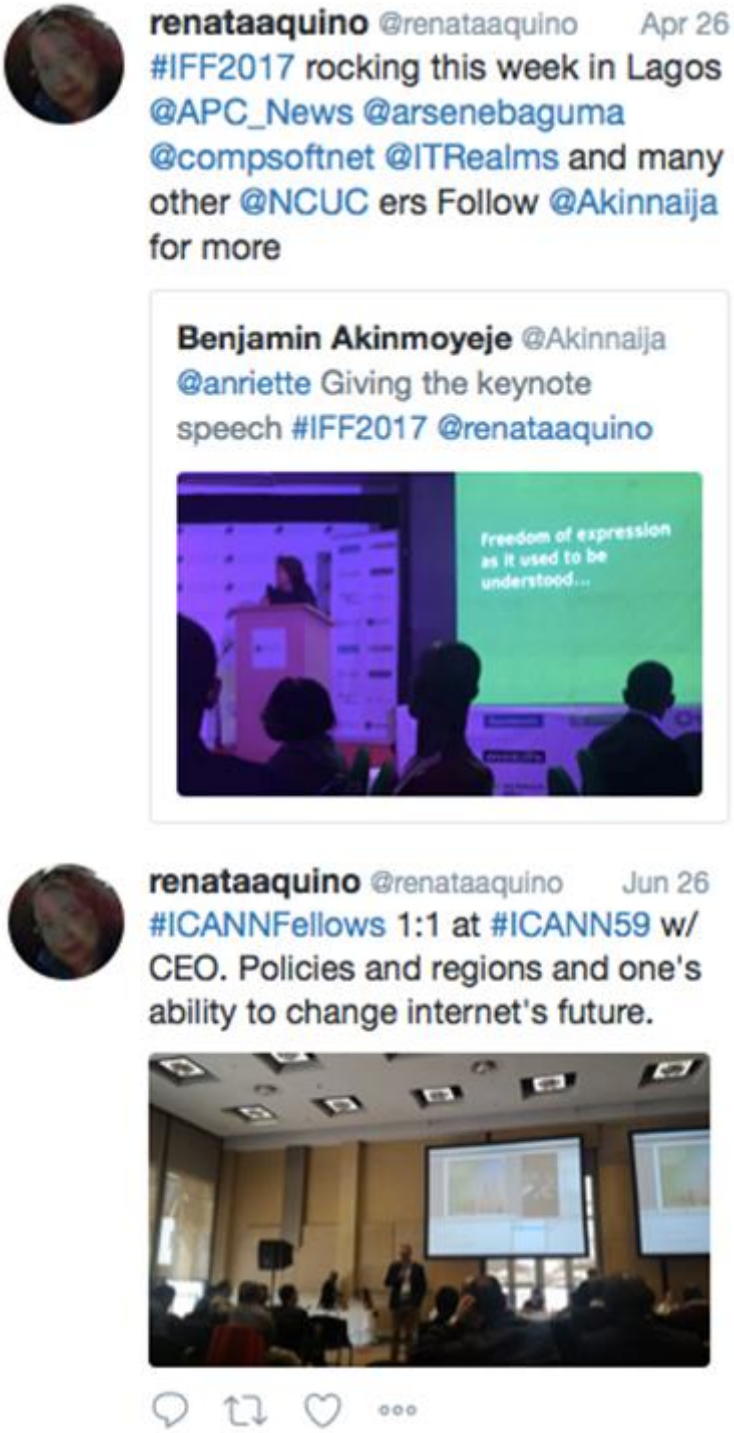
Other specific features researchers use in these platforms to create events and invite people to them. Likewise, the chat allows people to talk with other contacts. Another utility is to ask for feedback on a particular idea (what do you think about…?). These results contrast with the study of Collins, Shiffman & Rock (2016) who found out that this social network was used for personal communication with friends and family mostly, i.e. used in private contexts.

General social media is used primarily to communicate with other colleagues. Twitter is preferred for debates on their own scientific interests and also for keeping up to date on the news or about a certain topic, that is, is useful to have an update on the most recent things though the timeline. These uses of Twitter are also mentioned by (Collins, Shiffman & Rock, 2016).

Twitter is used as a multilingual channel, for instance one researcher writes her own Tweets in Portuguese but most of her Retweets are in English and come from English speaking colleagues or in other cases English speaking institutional accounts.

Hashtags for international conferences are also popular i.e. #ICANN59 or #IFF2017. ICANN59 was a policy forum held 26-29 June 2017 and the Internet Freedom Forum (IFF) was held at Lagos, from April 25 through 27 (Figure 6).

Figure 6: Hashtags for conferences



Researchers can connect with more people who are working on a similar subject with academic social networking sites. Sites such as Academia.edu and ResearchGate are important aids in in the research process but most importantly in the divulgation process since they serve as a medium to increase divulgation to the public, for instance one researcher asserts:

> *"Social networks like Academia.edu are something exceptional to disseminate research and help create groups to share files, projects, and things like that; Dissemination and access to various materials that were not previously available"* (L., personal communication, February 28, 2017).

Since both ResearchGate and Academia.edu reflect the academic hierarchies and scholarly norms since faculty profile have more views, downloads and metrics (such as the RG Factor) than students (Thelwall & Kousha, 2015; Thelwall & Kousha, 2014). This type of explicit participation is directly connected with social affordances.

The content, as a constituting element of Social Networking Sites (Van Dijck, 2013) has many forms. In academic social networking sites, the content is mostly copies from already published journal articles besides pre-prints.

The discussion about copyright of the content is generally not a constant issue for the researchers in these cases. Most researchers are not actually informed on the copyright issues related to the content shared on the platforms; they only know general things like that they can only upload content that they have authored or co-authored themselves. There are a couple of exception though.

On the one hand, educational technology projects –the research subject of a particular participant- have a longstanding issue with copyright agreements in educational platforms, sometimes the projects get removed from the platforms due to a series of matters such as inactivity. Nonetheless, people participating in such projects are usually unaware of copyright issues and have to learn on the go. Researchers argue that people should be informed on these topics and not blindly let other companies handle and deal with their personal and research data without them having a say on the issue.

On the other hand, there is another case where the researcher is aware of copyright issues she uses another approach for uploading articles in this platform. The first step is to check whether the article is copyrighted or not. If the article is not copyrighted, then it is uploaded on the platform so can people can find it and read it easily. If the article is copyrighted, then just the title is added to the platform and if requested it is sent directly through a private message to the requesting user. As she argues:

"*I consider my articles if I can share them or not, if they are copyrighted or not. Because in law, when you want to publish you often receive a contract that you need to sign and you will know if you article is copyrighted or not and I pay a lot of attention to that because we are doing law I can't just say "sorry, I didn't know*"" (D., personal communication, March 5, 2017).

6.2 Contacts for collaboration: social affordances

Social affordances refer to the different characteristics of social networking sites which allow social capital flows (Bucher & Helmond, 2016). There are many differing opinions when referring to the social affordances of the different platforms for the particular use in science communication or informal scholarly communication. Moreover, the formation and accumulation of social capital are not only related to social affordances but also to affordances of availability, scalability, visibility and multimediality while the offline social capital resources reflect themselves in the social networking sites (Figure 7).

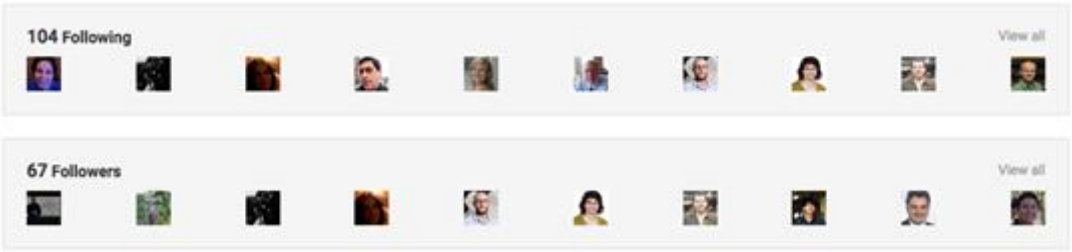
For example, early career researchers have few followers themselves but follow other people more. The online identities early career researchers cultivate online to show their research interests, preferences, history, social circles and all of this information can help other people -mainly other researchers- to see who to contact. Social Networking Sites make visible the previously invisible colleges in academia since the online platform embeds the infrastructure of the scientists' information use environment. However, all of these initial contacts must be later on endorsed by real life meetings.

It is tough for early career researchers to achieve an effective collaboration by the sole use of social networking sites. An integrated communication strategy with online and offline elements works best since social networking sites serve mostly as a booster of offline features and research outputs.

Figure 7: Different relations between social affordances

Social capital resources depend largely on people's position within a social network since social capital resources are evoked through interactions within the system (Ellison & Vitak, 2015). These social capital resources translate from the real world to the online screen. In academic social media platforms such as Academia.edu or ResearchGate, early career researchers follow more people than people following them (Figure 8). The proportion is almost 2:1 in most cases. In the same manner, a common point in nearly all early career researchers is that they follow more people but have fewer followers themselves on Twitter as well. The exceptional cases are when the researcher is more established i.e. has more offline social capital already; For instance, where the researcher already has a significant presence in papers, or participation in conferences or significative work experience before enrolling into the academic career.

Figure 8: Number of People Following and Followers of the same early career researcher



6.2.1 Invisible colleges

Social networking sites offer a large amount of detailed personal data which provides information on research interests and preferences, history, social circles. These online identities allow other users to find common ground in these visible profiles (Ellison & Vitak, 2015). Therefore, using social networking sites can help researchers to get new contacts and specially to know who to contact later or who is working this particular subject within the field and in which country. This feature is especially useful in study niches where very few people research about this specific area however face-to-face meetings -especially in conferences- are better for further collaboration. One PhD student (D., personal communication, March 5, 2017) puts it:

> "*Social media platforms help to know other people in your field, the problem with law is that when you do general law is easy but when you do specific law like aviation law or property law there are few people inside and to get inside this little circle is really hard so when you are invited into a congress you just go and meet new people and this social media helps you to see who they are and who are they working with and see other people who are doing the same things as you*".

Consequently, social networking sites can also serve as a way of making visible and tangible the different and previously invisible colleges in academia. As invisible colleges refer to a group of scholars communicating and collaborating in a particular subject, who may or may not share the same institutional or the same physical place (Zuccala, 2005). Social Networking Sites -mainly academic social media such as Academia.edu or ResearchGate - can help early career researchers identify who are the members of these invisible colleges since these sites provide the online and visible infrastructure for the scientists' information use environment (IUE) (Zuccala, 2005). This type of environment allows the discussion flow

and the interchange of artefacts such as data, publications, preprints, etc. and it is where "socially mediated behaviours that occur within the invisible college can be more easily observed" (Zuccala, 2005, p.164).

6.2.2 Further collaboration

There are cases where these initial contacts made through social networking sites -i.e. weak ties- have led to collaboration to write an article. But in other cases, to transform these new social media contacts into active and productive partnership has been hard. More time and getting to know the person are required for this specific aim; like V. argues (personal communication, May 24, 2017):

> "*I am trying to transform connections into something more effective; For example, to write articles with the colleague of the north of Brazil but with the international contacts has been a little more difficult*".

Online communication –with virtual links- works much better when researchers already had some face-to-face contact and then use web tools to cooperate (Wagner, 2008). This phenomenon also occurs in the case of Internet discussion groups that can help the development of weak ties but unfortunately do not transform this into actual collaboration (Zuccala, 2005). In other words, researchers think science still needs personal circles. Face-to-face meetings make it much faster to collaborate since initial new contacts made using social media platforms should be later "legitimised" by real life meetings with these new prospective peers.

An effective international collaboration -i.e. to write an article as a group or send a conference paper in a team- is very hard to achieve for early career social scientists. Even though the increase of international collaboration by using social media is a perceived benefit (Work, et al., 2015), it does not happen for early career researchers by the sole use of online platforms. Nonetheless, in the specific case of early career social researchers, this global online community is sort of a delusion since turning these online connections into tangible work is really hard for people within the same country and even almost non-existent with people from other countries.

This lack of effective international collaboration could be due to the fact that people prefer to interact and work with people that already know in real life (Boyd, 2010). Early career

researchers have not yet so many established contacts in an international environment and most cases, it involves online and offline constant contact. It would be interesting to find out if this same phenomenon occurs with established researchers with a high level of social capital in the real world. Some more lines on why this may happen will discuss in the section entitled Barriers to social media usage.

The constant use of different social networking sites and especially with cross posting practices and various interactions within the user's network generates an accumulation of social capital resources (Ellison & Vitak, 2015). Besides the formation or reshaping of a professional international identity as being active on social networking sites makes early career researchers feel part of a specialised international community. Twitter can help researchers feel they are part of a global community as connections across so many countries can quickly appear (Budge, Lemon, & McPherson, 2016). For instance, one researcher argues:

> "*I feel like an international researcher, I feel inside an international community that investigates what I investigate and has the same interests as I do. Without leaving Brazil, we know things that happen in other countries, I do not refer to countries in the centre because it is very easy to know what happens in the US, but it is not so easy to know what happens in Argentina or in Africa and though my available networks that are possible. Of course, you have to look for something, what comes from the United States and the western countries is always easier but if you look, you can find things from Africa and from Latin America…it makes me feel a citizen of the world to be on the social networks*" (V., personal communication, May 24, 2017).

6.2.3 Strategic uses

Overall, early career researchers argue that their social capital has increased with social media usage but with a particular condition. It is mainly an integrated communication strategy displayed multiple platforms: publications outputs (in research journals mostly), participation in conferences and social media outreach, all of these online and offline elements expand the circle and therefore, possibilities for further collaboration. Donelan (2016) argues that researchers who engaged in an integrated online communication strategy

across different platforms eventually have more successful results due to their different reasons for using them. However, this research points out that offline elements are necessary for this integrated communication strategy.

This strategy across different platforms and media formats is in line with the strategic uses researchers give to social media regarding their own necessities, competencies and skills (Veletsianos, 2016) and to engage in personal branding (Duffy & Pooley, 2017). A professional identity and academic connections (Budge, Lemon, & McPherson, 2016) are not developed only using a single social media platform, such as Twitter but rather as an integrated communication strategy within different platforms and types of media (both traditional and digital). Therefore, social media serves as a booster or amplifier of actual research outputs while entering a negotiation process throughout the different networks in search of the various ways of acquiring social capital.

The usage of Whatsapp as a social networking platform is mainly in a professional niche just as in the case of physicians and healthcare professionals (Gulacti, 2016; Arunagiri & Anbalagan, 2016; Sidhoum, 2017). In a particular case, the Whatsapp groups are the most useful recognised feature. Researchers are part of groups of peers and groups with people they are researching.

Groups of peers are composed of researchers who work in the same area and interchange information between them, for instance, questions about anthropology theory, news about a certain topic –between the study subject- in the form of links to websites or directly archives such as PDFs format. Groups composed by anthropologists and people they are currently writing about -researching- are a way of keeping in touch with the real-life community where an anthropologist has lived and interview for a long time during fieldwork. This form of communication serves as a substitute to social networking sites since sometimes there is not a stable Internet connection – since it is by satellite- in the Amazonian part where indigenous people live (these are mainly rural areas, not cities). After doing the fieldwork, researchers keep in touch and ask questions (when necessary); however, in the anthropologist's case, using WhatsApp was not the primary method of data collection since it was rather ethnography and interviews.

So basically, WhatsApp is used as to be part of groups of peers and groups with interviewed people. On the one hand, it is useful to have quick access to peers forum and on the other hand, it handy to keep in touch with communities. It is worth noticing that in this second use

anthropologists use WhatsApp as a secondary research method since the primary method is ethnography.

6.3 Availability

The availability affordance as defined by Schrock (2015) is a combination of different media coexisting at the same time, with the direct contact with people and expanded the frequency of communications through various locations. Various social networking sites afford early career researchers to ask for papers and to have access to different articles through these platforms while making available their own papers; in the same manner, the researcher is prone to upload their documents to the platform.

The availability affordance is then present in information access through the different platforms; especially when people ask for materials and have access to papers on these platforms. Particularly in the case of grey materials, preprints or valuable articles since those have been traditionally difficult to locate and access. For some researchers, academic social networking sites are not the first place to look for collaboration but rather to ask for references or to ask for papers, which the researcher didn't have direct access to due to a variety of reasons. In a researcher's words:

> *"I have maintained contact with people through social networks to ask for references or to request for sources to which I didn't have access, and this does facilitate the search for my research*" (J., personal communication, February 17, 2017).

The main perceived benefit of academic social media is about having more access to information. Instead of using traditional journals where payment is required, researchers have access to articles through the medium of academic social media platforms easily. Also, academic the social media also provide access to grey literature, such as unpublished papers and preprints. Hence, academic social media have enhanced the research process. Nonetheless, this type of affordance is competing with the institutional repositories (Björk, 2016) and journal’s publishers (Chawla, 2017) and most likely researchers are unaware of copyright issues when uploading content to these platforms.

Another actor related to this affordance is the academic library. These sites end up working as a substitute for the academic libraries since these institutions themselves have few

subscriptions due to lack of funding; researchers find it necessary to find the articles somewhere else, i.e. sites such as Academia.edu, ResearchGate or most recently Sci-Hub. As one scholar puts it:

> *"The library is small, with restrictive subscriptions, with few fields which are important to them, so they don't really are open to everyone. Everything is mostly published in Portuguese, [There are] not many things published in English...which makes everything more complicated"* (D., personal communication, March 5, 2017).

Academia.edu especially has become an important diffusion medium for the humanities communities from developing countries, who have difficulties accessing publishing channels such as established scholarly journals (Ortega, 2016).

This situation competes with the universities institutional repositories and academic libraries. Academic Social Networking Sites end up being used as a substitute for academic libraries in early career researchers, for instance for getting access to non-open access papers in academic social networks or asking for documents on general social media sites. This phenomenon could occur since libraries do not have sufficient access to increasingly expensive large collection subscription prices. Also, it is worth noticing that sometimes these sites are preferred to the institutional repositories when dealing with preprints just as Björk (2016) noted that some researchers preferred to upload content to these locations rather than in the repository of the university.

6.4 Scalability

The affordance of scalability is defined by Boyd (2010) as the ability to scale the contents so large numbers of people can see these contents. Scalability in social media is a perceived benefit. This scalability is mainly identified in a tangible way especially with metrics from academic social networking sites or social media in general. Scalability affords the existence of metrics derived from social networking sites. Social media metrics from the academic social networking sites provide early career social science researchers to know accurate information on which paper is the most accessed or downloaded overall.

Social media metrics are attractive to early-career researchers in terms to get hold of accurate information on which paper is the most accessed or downloaded overall. It is more of personal interest to know if the output that the researcher is sharing though these academic

social media platforms are useful for other people or if it is rather redundant work. As one researcher argues:

> *"These social networks indicators of the views or similar, I don't use those because they are not relevant to an academic activity perhaps at personal level may be a referent but does not have an immediate effect on my academic activity. Beyond having some reference on what contents are being consumed or which are being accessed beyond that there is no other reason*" (J., personal communication, February 17, 2017).

Metrics are important to see how much repercussion has a defined event related to their careers has had in social media. For instance, a book presentation can generate a lot of social media buzz (R., personal communication, February 17, 2017) and this may lead to social capital acquisition processes.

Self-monitoring -of their own research outputs but also of the career related events - by using the public analytics leads to a quantification of production as argued by Duffy & Pooley (2017). Nonetheless, in the case of early career social scientists, this does not appear to be of great importance, but rather of a mere reference. Since the evaluation systems of academic careers do not consider these types of metrics, they are just a reference; in all these cases, public analytics do not leave to a quantification of production or self-monitoring, as argued by Duffy & Pooley (2017).

6.5 Visibility

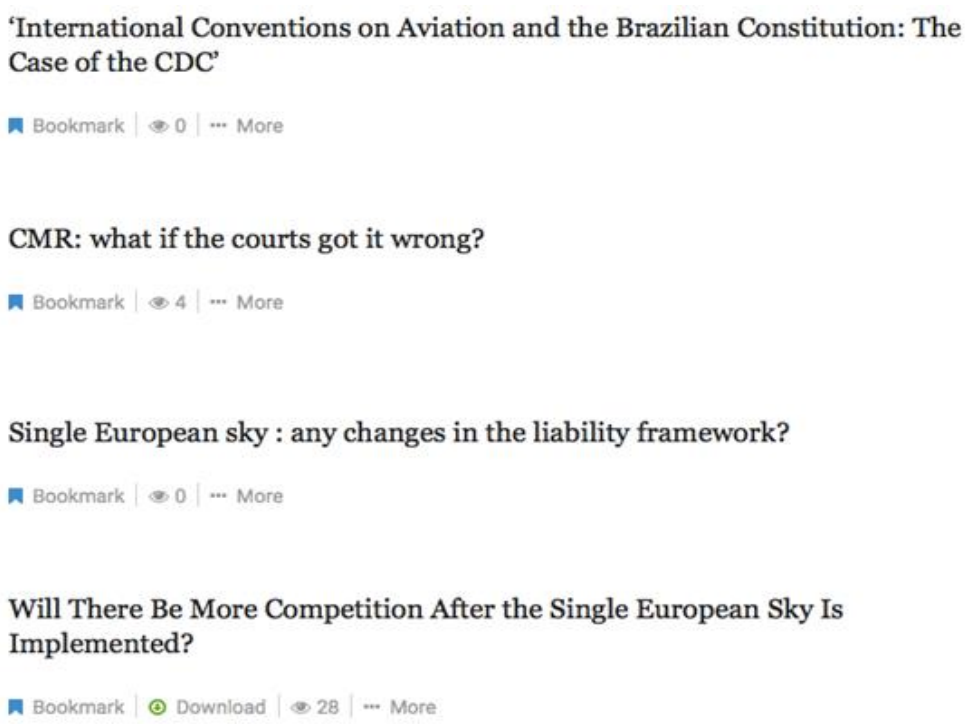
The visibility of different types of work is afforded by the different social media platforms. The visibility affordance allows people to see other content about or from someone else; therefore people – and their knowledge, both tacit and explicit- becomes visible employing the different platforms (Treem & Leonardi, 2012). This section first explains the visibility affordances on the content of researchers and then on the content about another researcher (their profiles).

Early career social sciences researchers can make their knowledge visible through the different Social Networking Sites. Researchers use these platforms to make their content visible to the public by uploading or republishing their work. In academic social media, the

papers that offer full access, rather than just a reference, are the ones have more views and downloads.

As one researcher argues: "*What happens is that when we publish in an indexed journal first, then we make it available in Academia.edu; it is a duplicate*" (L., personal communication, February 28, 2017). Furthermore, another point related to this affordance is when academic social networking sites such as Academia.edu and ResearchGate allow uploading previously published but not copyrighted papers. Those available documents that have more views and downloads are the one that offer full-text access rather than the entries with just the reference (like the title and the source). In Figure 9 there is an example of the difference in views of copyrighted papers and not copyrighted papers. The last one in the list "*Will there be more competition after the single European sky is implemented?"* is full text available in the platform, while the others in the list are just references.

Figure 9: Number of views of full text papers and non-full text papers



In the case of academic social networking sites, the visibility affordance is valid though a dialectic process: in one hand, researchers can access visible research though these platforms,

and they make their own research visible though these very same systems. As one researcher argues:

> "*It is important to have a reference of them and thus to have an idea of which is the level of development of the subject on their part which definitively influences in the research…Knowing that is what they are researching or also about the level and limits that they are going. With this information, I can project my research so to have a guideline of what things I can innovate in the subject*" (J., personal communication, February 17, 2017).

Related to the part of making research visible and how it is intertwined with the platforms:

> "*is more like a personal interest to see if my contribution is redundant in my area or as a personal assessment to know if what I am sharing is serving others as well*" (J., personal communication, February 17, 2017).

The visibility affordance is present when researchers decide to use academic social media to see if the proposed research is redundant in the area. These academic platforms – such as Academia.edu or ResearchGate - are useful to know which other people are also working on the same subject. Therefore to have a reference on the research patterns of a particular subject and see what aspects of it can be innovated in future research or rather to see if a research idea is redundant in the area and changed it.

Moreover, not only researchers can have access to academic social networking sites but also people from outside academia. For instance, in a particular case, the researcher used Mendeley for a project about creative economy. For this group project, the team used mostly a certain tool within this platform like the group's feature, which allows the user to create a sort of a specialised library with indexed content on a certain topic. While practising indexing within the creative economy group, people who didn't belong to the research group tried to sign up to the group and socialize with the members because of shared similar interests. This helped the team to get feedback and to have an idea of the prospective repercussion of the project (R., personal communication, February 17, 2017). This case clearly is aligned with one of the findings of Jeng, He & Jiang (2015) who argue that people sign up to Mendeley interest groups mainly to keep up with their research subject or to follow topics the community is currently discussing but not so much to socialise or find contacts.

When early career researchers make their profiles open -showing on research interests and preferences, history, social circles- Social Networking Sites affords them to connect with other people with the same research interests while converting latent ties into weak ties (Ellison & Vitak, 2015). Moreover, the visibility affordance allows people using social networking sites to connect with other users who share the same research interests while making content about another researcher visible, namely convert latent ties into weak ties (Ellison & Vitak, 2015). As stated in the social affordances section, social credentials are built upon resources coming from social ties and their network (Ellison & Vitak, 2015) but in order to start this process the profiles must remain visible so researchers can get specific information on research interests and preferences, history, social circles so that they can find a common ground in order to start a conversation.

6.6 Multimediality

Connectivity travels across different platforms and in between social networking sites, traditional media and scholarly communication platforms. Connectivity enhances communicative practices. Therefore, there is a multimediality affordance. The multimediality affordance as defined by Schrock (2015) refers to the combination of different types of media -for instance, audio-visual media- in the communicative practices. The multimediality affords early career social sciences researchers to combine different types of media -like audio-visual media- and platforms depending on which research output is the one to disseminate and the target audience it is intended to. There is the interaction between Social Networking Sites and scholarly communication platforms, with the particular interest in the national and regional ones. Researchers actively engage in self-branding using different platforms and linking their various accounts on various platforms.

Researchers are prone to use different types of media and platforms, such as social networking sites and the traditional scholarly communication platforms, so all these platforms do interact with each other. Regional academic communication platforms such as Redalyc and Scielo are very well known and highly valued within the country. In sum, the multimediality affordance situates between a combination of informal tools such as Facebook and Twitter and also academic tools such as scholarly communication platforms, Lattes. Researchers use national and regional scholarly communication platforms in junction with

social media to disseminate their work, depending on which research output is the one to spread to the target audience it is intended to.

The Lattes system in Brazil is crucial as an academic network in this country since it is the biggest online database for researchers (Massarani & Peters, 2016). An updated Lattes CV is a requirement for requesting funding such as grants and fellowships from the governmental office (Massarani & Peters, 2016). As such it is quite common to find their Lattes link which provides a much more detailed CV in the Portuguese language in the LinkedIn profile or Public Facebook or Twitter profile of researchers along with a mini self-presentation paragraph. In other cases researchers provide a lot of links to profiles on another platforms such as their profile at Twitter, Skype, or their own blogs.

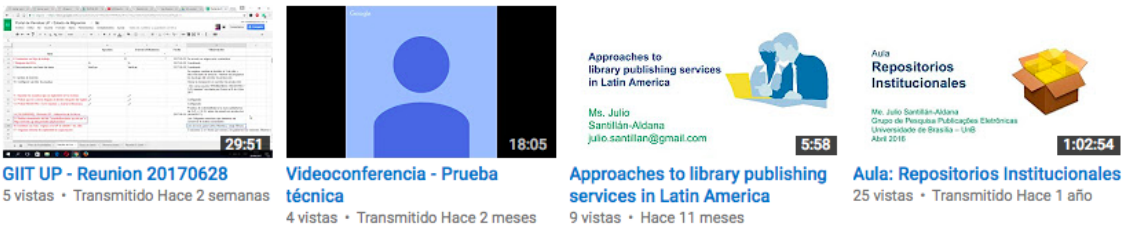
In some cases, researchers have experience in science divulgation using audio-visual media. Videos in platforms such as YouTube and webcasts are popular. Dissemination through the radio is also well received by people like listening to it. In both cases, researchers point out the importance of using the appropriate language to get the message across through different platforms. Since one of the main difficulties for science divulgation is the complex language, rewriting scientific language into more accessible day-to-day language is a solution for this problem.

The YouTube platform and other audio-visual media are used as a side platform, for instance, one researcher describes:

> *"Eventually I use other means like the case of audio-visual media, for example, I record abstracts of my works on YouTube and eventually use social networks to disseminate it but it is not the first line of media I usually use to circulate what I am researching*" (J., personal communication, February 17, 2017).

In this case, he collects video conferences with prospective customers, conference presentations and reproduction lists related to his degree. All the videos are available in either Portuguese, Spanish or English. However, the videos have few visits (Figure 10). In this case, user-generated communication channels do not have a high impact, contrary to what is argued by Welbourne & Grant (2015).

Figure 10: Videos collection in YouTube Platform



Besides audio-visual media, researchers also use visual media. Due to the lack of time of the readers; social scientists use other ways of presenting results such as using visual aids, like infographics. People who work in civil society or the business sector, public sector often have difficulties when dealing with a lot of information so it's important to pass along the most important data and research highlights in a visual research output, such as with infographics.

6.7 Barriers to Social Networking Sites use

There are some barriers to social media use which cause researchers not to use social media for science communication or not to use social media at all. This research identifies a variety of reasons: 1) lack of confidence, 2) lack of understanding of how social media works, 3) lack of awareness of certain types of Social Networking Sites, i.e. academic social media, 4) linguistic barriers and cultural things, 5) concerns on privacy issues.

Firstly, people think their opinion is not sufficient to put it out there, some kind of digital shyness or as Donelan (2016) puts it, a lack of confidence in generating content to be disseminated through social media. Digital shyness refers to, a lack of confidence in producing content to be dissemination through social media.

Secondly, there is a lack of understanding of how social media works. An absolute lack of awareness of how to write for social media. This situation could be caused by a series of circumstances, for instance, sometimes researchers require skills about how to use these tools (Donelan, 2016, p. 722). For example, as one scholar argues:

> "*there's also a lack of understanding of how social media works how do you build a Facebook post*" (R., personal communication, February 17, 2017).

Thirdly, the lack of awareness of academic Social Networking Sites, some researchers are not aware of their existence; or if they have an account in academic Social Networking Sites, they use these platforms as passive users since social affordances are not so clear in these specific types of platforms.

People are not aware of the fact that academic social media exist; some researchers think there are only general social media sites such as Facebook and Twitter. When this occurs people believe that using social networking sites is such a waste of time or unimportant, for instance, supervisors may ask "*You spend a lot of time on Twitter, when are you returning to your research?*" (V., personal communication, May 24, 2017).

Or when the researcher knows about academic social media, however, the platform is not so useful for them like other sites. User experience and social affordances in the platforms themselves is also taken into account when deciding to use –or not- an individual social networking site. For instance, for some people, academic social networks are too hard to use or don't offer as much synchronous communication with other researchers. As one interviewee points out:

> "*I have an account in academic social networks, but I do not participate much in them; Academia.edu, ResearchGate, for me is not so easy to use, these are static pages. For example, when you go on Twitter people are already talking, but in Academia and ResearchGate it is not very clear how to talk to people, or you have to talk to people as one by one. For example, on Twitter you can call the conversation to other people; In ResearchGate and Academia.edu, it is very close*" (V., personal communication, May 24, 2017).

In like manner, in other case people do not engage in conversations in academic social networks "*contacting people on ResearchGate is sometimes fruitless -people don't answer back- so communication is complicated*" (D., personal communication, March 5, 2017).

Certain issues such as linguistic and cultural barriers translate from the real world to the digital arena, contradicting the paradigm which argues that social media makes communication even easier. Linguistic barriers and cultural things –such as academic status- are also present as they translate from the real world to the online world. This issue contradicts Budge, Lemon, & McPherson (2016) who argue that Twitter is breaking down some of the invisible barriers.

As an example, using only Spanish or Portuguese on social networking sites is not enough for an integrated communication strategy aiming to an international audience. Nevertheless,

using English but in a colloquial way or with typos makes other researchers not take peers seriously. As V. (personal communication, May 24, 2017) points out:

> "*There is also academic status, for example, if you do not speak English very well or if you talk colloquially or with mistakes you may not be taken seriously. Then I think the networks make some things easier, but there are other challenges such as transposing these linguistic or social, cultural or economic obstacles, because it is not true that everyone is in the networks".*

English turns out to be the primary language when communicating with other researchers, just using Portuguese -which is the official language in Brazil- is not enough for efficient use of social media. This preference is an interesting development since it mimics the current state of scholarly communications, on which writing articles and publishing in English language journals is the most valued kind of research, over regional publications which use the local languages which are Portuguese and Spanish in the case of Latin America.

Some concerns on the management of privacy and safety due to the blurring of private life and the public sphere are also pointed out. The negotiation between the private life and the public arena of researchers is complicated to define for early career researchers. Concerns about privacy and safety are also present (Donelan, 2016); some researchers claim it is hard to draw a line between personal or private life and the public sphere meaning work related stuff in social media. The negotiation between what constitutes the private life and the public sphere is also blurring and is getting complicated to define (Duffy & Pooley, 2017). One researcher refers to this phenomenon as "*closing our digital borders, so we have to manage our information ourselves*" (R., personal communication, February 17, 2017).

6.8 Hierarchy and prospective of Social Networking Sites (SNSs) in the academic culture

On the perspective of Social Networking Sites in the academic culture, there are some differing opinions. Some of the early career social sciences researchers point out that social media has a positive impact in Academia; while others are not so positive and think these supposed changes are mostly superficial since larger and structural changes take time.

On the one hand, some early career social sciences researchers think social networking sites are already changing the academic culture. Researchers argue that social media has already

changed the academic culture since it has enabled a more horizontal knowledge sharing. Academia is a community of scientists that keep communicating, and now this communication has become flatter. Social media has allowed people to ask and give feedback instantly, as one researcher argues:

> *"You can give them feedback immediately and ask them questions they may or may not answer you but that doesn't mean it's worse than before; it's actually better because you do have that possibility before you didn't. So, I think it has built a community in that sense it has radically change Academia, so we are now much closer than in the Ivory Tower as before"* (R., personal communication, February 17, 2017).

Social networking sites, such as Twitter allow a sense of non-hierarchical structure as communication can happen in a much more faster way. The sense of non-hierarchical structure in Twitter can help researchers to get in contact with people that most probably previously would have been outside their scope of reach. Therefore, Twitter –and over all other social media platforms as well- helps early career researchers to get more fluid connections (Budge, Lemon, & McPherson, 2016). The connection, however, may or not happen, as the early career researchers can try to get in touch with someone specific but this person may or not answer, but the possibility is there already.

Teaching processes being enhanced by social media has also been pointed out, for instance, active participation in Facebook interest groups help to complement classes. At the university level and through referring to teaching processes, interaction with students through social media is also beneficial. Students are active users and are also very comfortable using these types of new media. Therefore, the active participation in Facebook groups is ongoing. Facebook especially is beneficial to complement classes since there is a continuous dialogue to analyse a problem.

On the other hand, the disagreeing opinion points out that the changes social networking sites had had in academia are still superficial since shifts in the way of making science takes a lot of time. Maybe in a long term social media will probably influence the way researchers communicate, but for now, it is still a very traditional way of communication using articles in journals, and conference presentations since no other form of communication are rewarded by the evaluation systems. There is the opinion that changes in the way of making science take some time; it is, even more, time for particular areas of knowledge. Therefore, at some

point, more in the long term, social media will probably change and influence the way researchers communicate. Progressively, social media will be considered as reference spaces for science diffusion, mainly through the incorporation of metrics into the evaluation systems but it not the case now.

Finally, it is interesting pointing out the fact that none of the interviewees refers to the fact that there is a danger of profit academic social networking sites converting into the new companies managing scholarly communication (Duffy & Pooley, 2017). A sort of successors as just as before big business managed -and some still are- large numbers of journals.

7. CONCLUSIONS

The general aim of this paper is to understand the different practices and strategies early career researchers and PhD students from the social sciences have in Social Networking Sites (SNSs) for science communication in one particular country: Brazil.

The central research question is which are the motives and rationale of early career researchers and PhD students from the social sciences for using social networking sites for science communication. To answer this explorative question, this thesis uses an affordances approach. The results emerging from data analysis are available in Table 3 in a short format. The primary motivations for using different Social Networking Sites are all related to connectivity: communication with peers and in less degree to the public and research subjects, updating themselves about their research issue, dissemination of research, availability of papers, self-branding and participation in interest groups are the most mentioned. These motivations translate into cross-posting practices and integrated communication strategies -combining online and offline elements- on the different Social Networking Sites. These motivations translate into perceived affordances all related to social affordances, therefore, social capital processes: availability, scalability, visibility and multimediality.

The relationship between the academic system of this country and the practices and strategies in Social Networking Sites is complex. The academic system rewards only traditional ways of scholarly communication. This system of this country has remained unchanged as it privileges traditional scholarly academic formats such as journal articles and conference presentations; therefore, early career researchers and PhD students from the social sciences only use the different Social Networking Sites (SNS) as a side aid but not as a primary means of communication, usually combining online and offline strategies and practices. Since the academic system privileges scholarly communication outputs; social media is underuse as a means of public science communication, even though these platforms offer a lot of advantages for pursuing such issue.

Traditional science communication practices translate into the use of Social Networking Sites (SNSs). The most important issue that came out in this report was the fact that social affordances provided by Social Networking (SNSs) are still required to be endorsed by real life meeting to start further collaboration; Otherwise, these links keep dormant. Moreover, some people believe that using social networking sites is such a waste of time or unimportant. Finally, linguistic and cultural barriers, such as the use of English as the primary language of science communication translate from traditional science communication channels to Social Networking Sites.

Finally, further research could focus on a variety of related issues: 1) for instance, how Social Networking Sites usage serve early career researchers to career enhancement and career development; 2) another point worth investigating is the fact if this same relation of social media use and the academic system repeats itself in different countries (with different reward system stratification) or within various fields (i.e. natural sciences); 3) How active international collaboration through Social Networking Sites in established researchers with a high level of social capital in the real world develops, this will be crucial to assess whether established researchers still need a "legitimization" process after making an initial contact with prospective colleagues through different social media platforms; 4) how communities of researchers communicate in places where the official language is other than English, this will be important to check if the prevalence of English language as the science language (even in Social Networking Sites) is still present or not; 5) at last, other research could be related to open science practices and how do these practices relate to the use of social networking sites.

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9. ANNEX

9.1 Interview guide

General information

Which is your degree?

Where do you work/study?

In what generation would you fit yourself?

Science dissemination

Do you consider it is important to disseminate your research projects to the public?

What does your department mandate in terms of divulgation of science?

- Is science dissemination part of the rewards / evaluation system of the university, the institute where you work?

How is dissemination rewarded in your institutional environment?

How do you disseminate your research to the public? What channels do you use for that purpose?

- how did you start using your mix of channels?

What difficulties do they present when communicating science?

Social Networking Sites

What social media platforms do you use for science communication?

Which functions do you use in these social media platform? i.e. Do you Share content / socialize in the social network?

How have these social media platforms improved your research? (If there is an improvement)

What benefits have you gained from using these social networks? (If there are benefits)

Are the metrics of these social networks part of the evaluation system of your institution or funding agencies?

Have you found any reticence in the use of social networks?

Are you familiar with the copyright situation of the content deposited in social networking sites?

Do you think that social media can change the academic culture?

9.2 List of codes and categories for data analysis

Id	Parent Id	Title	Description
1		Science Communication	
2	1	Science communication makes research relevant	
3	1	Science communication opens opportunities for further collaboration	
4	1	People think it is useless for science communication	
5	1	Traditional media	TV and radio interviews with magazines
6	1	Public science communication is not valorised	
7	1	Made with people's permissions	Photographs have to show with people's permissions beforehand
8	1	Science communication as a way of having feedback	
9	1	New media	
10	1	Science communication as an accountability measure	Public science communication about indigenous people is important and relevant in society, traditional media calls researchers to talk about it in TV and radio Studied in public university with tax payer's money, so science divulgation is a way of giving back to the public so they can see what they have payed for
11		Social Networking Sites	
12	11	Mendeley	For uploading articles and tagging the articles The generated tags allows the researchers to see what is being talked about Other people also seeks to access the curated content
13	11	Zotero	For using the groups features, which allows building a specialized library on a certain topic (relevant to a specific research project) Other people also seeks to access the curated content
14	11	WhatsApp	to get in touch with the subjects of study (indigenous people), to ask specific questions after the field research to get in touch with colleagues, there are WhatsApp groups of colleagues, to stay in touch and to send work related links, news and articles
15	11	YouTube	For recording abstracts of the things, he researches about
16	11	Facebook	For tagging the immediate network once the research is finished For forming groups based on specific topics (no use of the general timeline): these groups share specific information on one topic (related to the group) Data from Facebook do not belong to the user For communicating stuff, in LATAM a lot of people are Facebook users Facebook chat for work related communication For making contacts which eventually may lead to actual collaboration (like a paper)

17	11	Twitter	For search for an specific topic and publishing the research itself for debating For asking questions and ask for feedback For maintain oneself updated though the timeline For making contacts, it is the medium to get into the other media (such as podcast and blogs) For searching interesting hashtags For meeting new people though the hashtags search (they talk about similar interests) For meeting new people, in one case the researcher's met the PhD advisor after tweeting about her defence, the advisor showed up to hear it
18	11	Academia.edu	to interchange papers with other colleagues first the article has to be published in a journal, then the researcher uploads it to Academia.edu, the metrics of Academia.edu are not counted in the evaluation to have access to articles and other materials which previously we didn't have access Indicators of the SNSs are just for general information (to see which research is being read) but it is no relevant It is too close and static, it is not easy to engage into conversation in this SSN search for new articles or also to publish my articles
19	11	ResearchGate	Uses the alert system to keep up to date Indicators of the SNSs are just for general information (to see which research is being read) but it is no relevant It is too close and static, it is not easy to engage into conversation in this SSN search for new articles or also to publish my articles Not easy to make new contacts, because people don't answer back
20		Researcher's Data	
21	20	Age	
22	20	Specialization (degree)	
23		Rewards/Evaluation systems	
24	23	Lattes	Lattes is a funding requirement in Brazil
25	23	Social relevance of research	
26	23	Books	are not high in the scale of evaluation, but are important to generate social media fuzz at events (social media impact)
27	23	Blogs	Blogs in evaluation systems
28	23	Social media metrics	not translated into evaluation systems maybe in the future for blogs
29	23	For the evaluation system only scientific work counts (not public science communication)	
30	23	Publishing in international journals is better than national journals	
31	23	Journal publication is a requisite for evaluation system	
32	23	Conference participation is also mandatory for the evaluation system	
33	23	Social media is not part of evaluation system	
34	23	Social media may be considered in the evaluation systems in the future	Lattes Platform already considers blogs entries and science divulgation work; however, it is not part of the evaluation system
35	23	It is mandatory to publish in Portuguese, which is not convenient internationally	
36		Affordances	
37	36	Cost	Information available though is free (this does not happen in normal journal articles or conferences)
38	36	Knowledge sharing	in academic social media, you have to upload stuff so you can download it
39	36	Important to have a purpose in mind	
40	36	Aid in education	
41	40	Interact with students	
42	36	Aid in the research process	
43	36	To have a reference on previous research	and who is researching this specific subject

		(academic social media)	
44	36	Social affordances	
45	44	Communication strategy	social media, publications, conferences
46	44	Face-to-face meetings	social media is great for a starting contact, but real meetings are mandatory later
47	44	Transform new contacts into active collaboration	It is difficult, but researchers are trying to get there
48	44	Part of an international community	
49	44	To get new contacts	New contacts later "legitimized" with person-to-person contact in conferences social media as a first approximation but to be able to build groups later, it needs more time and contact and trust in the other person Social media platforms useful to identify key people and they try to contact them face-to-face in conferences; especially useful in study niches where very few people research about this specific field
50	36	Connectivity	
51	50	Connection	social media platforms allow people to connect with other researchers enables a two-way communication a more horizontal academia
52	50	Aid in divulgation process	
53	50	Distances (between people) disappear a little	
54	36	Availability, locability, visibility	
55	54	Academic social media to see if the research is relevant in the area or if it has already been done	
56	54	Access to information	to papers who the research didn't have access
57		Reticences	
58	57	Digital Shyness	Not good enough to put out there
59	57	Lack of understanding of how to write for Facebook	
60	57	Privacy	Line between personal and public image close and delign digital borders: manage owns digital information
61	57	Slowness	traditional media for scholarly communication is very slow
62	57	People don't know about academic social media	
63	57	People only know about general social media	
64	57	People think it is a waste of time (time it should have been spent in research)	
65	57	Social talk is unimportant, only articles (traditional scholarly communication) is important	
66	57	Copyright	People in the educational technology area are not very aware of copyright issues In Anthropology, no idea about copyright in Academia.edu Only to share content in which one is the author People are not aware if these issues, it is unimportant
67	57	Social barriers still standing	like academic status; language issues (if you don't master English language you are not taken seriously, Portuguese and Spanish is not enough); economic issues (people may not have a stable internet connection to follow an online conference and chat on Twitter)
68		Language	important to use simple words when talking to the public scientific words when talking to other colleagues
69	68	Language when communicating science	Language needs editing from formal to normal
70	68	Prioritize results rather than data	
71	68	Pass along important data and research highlights	
72	68	Infographics	

73	68	easier to talk rather to write	
74		Scholarly communication	
75	74	Scholarly communication platforms	internationalize dissemination of research
76	75	Scielo and Redalyc	
77	75	ORCID ID	
78	75	Google Scholar	For researching most current research For indexing content, citing articles
79	74	Traditional scholarly communication media	Though journals and conferences