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The Digital as Prosthesis: The Role of Social Media in Autistic People's Lives

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Autistic people usually experience difficulties in communication and social interaction and, as social relations are marked by rules that privilege those with mainstream brains, social media play an important role in mediating communication for autistic people. To investigate these processes and observe how digital media can be seen as a cognitive prosthesis, we carried out a digital ethnographic study involving Brazilian online communities about autism and for autistic people, triangulating data via participant observation and online interviews. By doing so, we observed how social media provide a more controllable environment in which autistic people can better communicate and interact with similar others as well as with "neurotypical" people. While for many people digital media may augment interaction and expand the capabilities of the human brain, for autistic people it offers the chance of being part of a society that often excludes them, although it also comes with risks.

Keywords: autism in Brazil, social media, cognitive prosthesis, disability

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Medically, the Autism Spectrum is defined as a developmental disorder marked by difficulties in communication and social interaction, and restrictive patterns of behaviour and interests that can vary along a spectrum (American Psychiatric Association, 2013). It may be accompanied by intellectual and language impairments and associated with other medical conditions, resulting in different manifestations of autism, which justifies the use of the term "spectrum" to embrace the diversity of autistic brains. Beside this medical view, the social view of disability proposes an alternative definition of autism, which is seen as a neurological difference with its own benefits and drawbacks (Singer, 1999). Those with autism or other neurological differences (such as attention deficit hyperactivity disorder, dyspraxia, etc) are called "atypicals" or "neurodivergents", while the ones with a mainstream brain are called "neurotypicals".

As Ortega (2009) explains, neurodiversity implies that some characteristics described as illnesses are, in fact, the result of a different neurological wiring and should be embraced as part of human diversity. The neurodiversity movement does not deny the necessity of treatments to overcome the challenges presented by autism nor the importance of taking care of illnesses that are common among autistic people, but they promote tools to provide accommodation for different needs, acceptance, and inclusion.

According to Robertson (2009), neurodiversity relates to four core domains: (1) language, communication, and social interaction; (2) sensory processing; (3) motor skill execution; and (4) goal-oriented and reflexive thinking, planning and self-regulation. Starting from these core areas, all autistic individuals have different strengths and weaknesses and, by identifying them, they can work to improve their skills.

In this paper we explore how social media can affect the four aspects defined by Robertson (2009), focusing in particular on language, communication, and social interaction. To do this, we draw on a case study of three Brazilian Facebook groups in which we conducted a digital ethnographic study. The data gathered includes fieldnotes and posts from the communities, which were analysed qualitatively according to the theories developed in the next section.

In this paper, we argue that social media can operate as a cognitive prosthesis to help autistic people develop their communication and social skills, although social media do not come free of danger as autistic people may be particularly vulnerable online. The idea of media as prosthesis is not new; technology has always been used as an extension of the human body, mediating our perception of the world and giving new possibilities to human's capabilities. For instance, digital media are said to augment people's abilities by providing new forms of memory that go beyond the human brain or by changing our ability to read and process information (Hayles, 2012; Floridi, 2015). However, for autistic people the stakes are higher because digital media, particularly social media, can remedy the challenges they face in social interaction and strengthen the voice of autism communities.

Since language matters when we discuss disability, we choose to use "identity first" terminology, as autistic activists affirm that autism is an essential part of one's identity and should be valued as such (Brown, 2011). Thus, we talk about "autistic people" instead

of "people with autism". There is also a distinction between different kinds of communities: the members of "autism communities" are autistic people as well as their supporters and relatives, while "autistic communities" are exclusively designed by and for autistic people.

LITERATURE REVIEW

The Digital as Prosthesis

Funk (2012) defines the prosthesis as "an adding, advancing, and giving power to that which it is extending" (p. 4). She adds that it creates a symbiotic relation in which the prosthetic apparatus and its user are constantly changing each other. Scholarship about prostheses also talks about how their usage creates a paradox in which they remedy deficiencies but simultaneously mark them by considering some bodies as incomplete, creating relations of extension but also dependence (Jain, 1999).

Although the term "prosthesis" mostly refers to physical mechanical adaptations inserted in the human body, in this paper we use it to discuss media, a metaphor already used by McLuhan (2010). We focus particularly on digital media as virtual extensions of the cognitive system. In their Online Manifesto, Floridi et al. (2015) discuss the ubiquity of digital technology, permeating all aspects of the human condition and blurring the relations between human and machine. The idea of the digital as a cognitive prosthesis follows this line of thought, as it supposes the blurring of the boundaries between the brain and the digital.

In media theory, the prosthetic apparatus can be understood under the logic of the posthuman, which views "the body as the original prosthesis we all learn to manipulate, so that extending or replacing the body with other prostheses becomes a continuation of a process that began before we were born […], the posthuman view configures human being so that it can be seamlessly articulated with intelligent machines" (Hayles, 1999, p. 3). This is reminiscent of other theories such as Haraway's writing on the cyborg (2010), where she conceives the prosthesis not only as an extension but also as a metaphor to criticise societal constructions; and the psychoanalytical Freudian robot of Liu (2010), who criticizes both the cyborg and posthuman theories for not clarifying the political and psychic foundations of the relation between humans and machines. While all these

scholars made significant contributions to the field, in this paper we focus on how the digital affects human cognition, drawing on the symbiotic relation and the constant feedback responses proposed by Hayles (1999) and Liu (2010), as well as the positive and negative consequences of this relation.

Chayko (2017) calls contemporary society "superconnected", stating that technologies are shaped by humans and in turn shape the way humans deal with the world and themselves. To her, digital technologies "have become embedded in the way people live, the way they think, the way they associate with others" (5). Other scholars have developed more precisely how human brains can be extended by technologies. Thus, Hayles (2012) states that the more machines carry out sophisticated cognitive tasks, the more digital technologies are seen as an extension of human thoughts rather than external devices. For instance, the way digital media impact writing and reading is seen as primordial for cognitive changes in terms of memory and information processing (Lévy, 1995; Liu, 2010; Hayles, 2012). On a more negative note, Carr (2010) adds that the digital is promoting a decline in our abilities to understand texts and in our general intellectual capacity, as it decreases one's concentration span. Meanwhile, Hayles (2012) points out that research has shown that people who read digital texts, mainly hyperlinked ones, can access different angles and thus, be better prepared to take a position. Coeckelbergh (2013) summarises the prosthetic relation of digital media as follows:

> If the capacities of our mind are limited, it seems reasonable to try to extend it with computers, electronic networks, mobile phones, and other electronic information and communication tools. Indeed, it seems that this is exactly what we are doing these days: we get used to thinking with electronic devices, that is, we think through electronic devices. We "enhance" our thinking, our actions, and our experience by connecting to the internet. The devices by which we "connect" (almost) become part of us. The electronic device becomes a cognitive-perceptual prosthesis: it is an extension by means of an artificial device (p. 106).

Coeckelbergh's (2013) analysis is worth mentioning as he also draws attention to the fact that, although technologies are often created to reduce vulnerabilities, they also create new vulnerabilities. He argues that digital technologies are often interpreted as threatening security, privacy and autonomy and enumerates five changes which entail

new vulnerabilities. First, disembodiment: although the digital tries to overcome the limits of the body by promoting a disembodied virtual circulation, our perceptions are still embodied, but now shaped by the digital. The second aspect is disengagement and the third de-socialisation, both related to the fluidity of online relations and the non-commitment to which they lead, which may be seen as empowering but actually just changes the way we relate to others and does not necessarily decrease commitment or engagement, while the digital may additionally create instances of hyper-sociality which require constant feedback and in which we are living under the gaze of others. The fourth aspect mentioned by Coeckelbergh (2013) is virtualisation and the fifth escapism, as virtual dimensions allow us to create representations of ourselves that can be less vulnerable and may be seen as a way to escape the offline world. Nonetheless, the virtual is not a separate sphere from reality and the virtual relations can still affect the person. Moreover, Coeckelbergh (2013) reminds us that cyberspace is a social place and we enter it bringing along our pre-existing social vulnerabilities. In conclusion, it is clear that the same aspects which can decrease vulnerabilities, are, in fact, also creating new forms of vulnerability.

Social Media and Autism

boyd and Ellison (2008) define social media as platforms allowing users to connect and share information with networks and with each other through the construction of a public. In this paper we focus specifically on Facebook, which Sutcliffe et al. (2011) classify as a social mediating technology because of its social affordances, which means that the platform enables social interaction among people. Facebook is popular across different age groups and is the most used social media platform among parents in general (Duggan et al., 2015), which is also the case in the autism community (Mohd Roffeei et al., 2015) since people tend to use Facebook to look for social support and to exchange information. Some of the social affordances of Facebook are the ability to connect with different networks and to facilitate communication among these networks, posting and sharing functions, interaction through comments and buttons (i.e. the "like" button), private and group communication, as well as a friendly interface that allows more and more people to join the platform (Fox & Moreland, 2014). While many other social media are more niche

specific, Facebook gives users the freedom to craft their own presentations and norms, based on personal allegiances and tastes (Papacharissi, 2009).

Although the relationship between autism and social media has not been discussed in terms of prosthesis yet, there are many scholars and autistic advocates who have discussed the impact of social media on the autistic community. In terms of communication management, Newton et al. (2009) and Davidson (2008, 2012) affirm that digital environments can better accommodate autistic people by removing the need for social cues which is present in face-to-face communication and by giving more time for processing information and responding, thus facilitating communication for autistic people among themselves and with neurotypicals. Van der Aa et al. (2015) add that digital communication gives more control over presentation, structure and predictability, which suits the autistic brain.

On the side of autistic advocates, Nelson (2004) mentions that "people on the autism spectrum have a unique social network, this is primarily using communication with text on the internet. It is an invaluable community for many of [them]." Dekker (2006), a Dutch autistic advocate, further reinforces this by stating that the internet is for some autistic people what sign language is for the deaf community. Moreover, the internet allows the creation of a culture and community for autistic people as it brings adults on the spectrum together. Scholarship in the field also addresses how the internet facilitates interaction for autistic people by giving them more control over communication issues, offering opportunities to create and sustain relationships (Benford & Standen, 2008; Davidson, 2008). Benford and Standen (2008) summarise the aspects that make internet-based communication easier for autistic people: (1) lack of nonverbal social cues, (2) use of text-based resources to make emotions explicit, (3) ease of focus, (4) adaptable pace of communication, (5) more predictable environment, (6) absence of face-to-face contact, and (7) anonymity providing a safe net for the ones who are not yet comfortable to present themselves. Despite all these benefits of digital media, there is also research linking the use of the internet to anxiety, isolation, and depression (Romano et al., 2013), which are more common among neurodivergents than in the neurotypical population (Murphy et al., 2016).

Silberman (2015, p. 257-258) emphasizes that social networks "held the potential for not just 'augmenting' communication but making it possible, period – minus the stuff that normally made conversation so arduous, such as eye contact, body language, tone, and the necessity of making a good impression." He adds that the practical constraints of communicating online also require many implicit aspects of social interaction to be made explicit, giving autistic people enough social cues to make communication easier, such as the use of hashtags (e.g. #sarcasm). Thus, while for neurotypicals information technologies provide "symbol manipulation technologies that allow [them] to extend [their] cognitive and social capabilities and do so in a networked manner" (Tufekci, 2013, p. 34), for autistic people, they do not simply extend, but actually create capabilities that would otherwise be difficult or impossible.

METHODS

To get a deeper, empirical insight in these matters we use digital ethnography to explore the actual uses of Facebook by different communities. The practice of ethnography in digital environments consists of immersing oneself in an online space and understanding the cultural processes that happen there while also participating in them (Boellstorff, 2013; Hine, 2000). Broadly speaking, ethnography "consists of a researcher spending an extended period of time immersed in a field setting, taking account of the relationships, activities and understandings of those in the setting and participating in those processes" (Hine, 2000, p. 4-5). Regarding the practices conducted by an ethnographer, Boellstorff et al. (2012) mentions that they "combine elicitation methods (like interviews and focus groups) with participant observation, which, as a method not predicated on elicitation, allows us to study the differences between what people say they do and what they do" (54). By doing so, an ethnographic project aims at providing thick descriptions of a certain group or culture by focusing on the perceptions that participants have of themselves and associating the possible findings with academic analysis and theoretical knowledge. In the case of digital ethnography, the field site is not a physical one but cyberspace, which is seen as a place that allows a cultural exchange and ties "texts to particular circumstances of production and consumption" (Hine, 2000, p. 52).

Research about autism and its articulation with other aspects becomes more and more important with the rise in diagnosis, as it gives society a tool to better understand the condition and also provide the autism community with an idea of possible points of interest. Moreover, in view of the lack of research on social media in the Global South, for this research we studied Brazilian autism communities in an attempt to promote a diverse voice in a field still dominated by research from and about the Global North. The exclusion of countries in the Global South eliminates the chances of discussing the particularities of their circumstances and stage of development, which is important for both the social construction of disability and for the way people use social media (Stein-Sparvieri, 2012).

The communities we studied were *Sou Autista… Conheça o Meu Mundo* (I am Autistic… Know my World), *Lagarta Vira Pupa* (Caterpillar Turns Pupal), and *Grupo Asperger Brasil* (Group Asperger Brazil). At the time of data collection, *Grupo Asperger Brasil* had around eight thousand members, *Sou Autista… Conheça Meu Mundo* around twenty thousand, and *Lagarta Vira Pupa*, which is associated to a homonymous weblog, was followed by around eighty thousand people. The last two communities were mainly composed of parents of autistic people, while the first one mostly contained autistic people themselves. The groups were chosen for following Kozinets (2010) principles of being data rich, relevant, and active. Although there are numerous groups created by and for parents in Brazil, while doing the initial observations it was verified that they follow the same dynamics and *Sou Autista… Conheça o Meu Mundo* was the one that best meets the requirements along with *Lagarta Vira Pupa*. As for the autistic community, there are a few groups whose description targets autistic people, but most of them restricted to autistic people. We chose *Grupo Asperger – Brasil* because it was made by autistic people and for autistic people, but yet allowed the participation of members from the autism community. For this paper, we were mostly interested in the participation of autistic people. Hence, most of the observations come from *Grupo Asperger Brasil*, although there were autistic people participating in the other groups as well, which justifies their inclusion in observations.

The groups *Sou Autista… Conheça o Meu Mundo* and *Grupo Asperger – Brasil* follow the same format and affordances. In these groups, members can access content after sending a joining request that has to be accepted by the administrators or moderators of

the groups. After being accepted, members are all in the same hierarchy and can post content which will be organised in a timely manner according to either the original post or the comments in the post. Those who are not members of the group cannot see the posts. As they are not public groups, members cannot share the posts from other members, thus they can interact through the like button or the comment section. Meanwhile, *Lagarta Vira Pupa* is a public Facebook page owned by Andrea Bonoli, so posts made by her appear on the front page. Other members can also post on the page, but their posts do not have as much exposition as hers; posts by members appear at the left side of the page when using the desktop version. Posts made by Andrea as well as posts from other members are open to interaction with other members, which can like, comment, or share the posts.

The first author conducted a digital ethnography of these three autism communities on Facebook from October 2014 to September 2016. During this period, she observed and participated in the groups, continuously taking fieldnotes and collecting samples of conversations taking place. She actively participated of on-going conversations and also created posts in the group either with questions or to share content that was discovered during the research. Furthermore, the Facebook's archives and search engine were used during data collection and analysis for consultation and clarification of the elements observed during participant observation. Those tools were used when a pattern emerged from the fieldnotes and observations, as they could be used to confirm whether it was recurrent in the group.

Data gathered during participant observation was triangulated via online interviews with ten autistic people. The interviewees ranged from 20 to 35 years old autistic individuals who were invited after the digital ethnography was conducted. They were selected from a sample of individuals who were active in the communities and individually invited to participate. Although we invited a balanced population of females and males, more females (7) were willing to participate.

After data collection, the fieldnotes and samples from the communities were analysed through a qualitative inductive method. The elements were grouped according to their relations to the theories discussed, mostly relating the categories proposed by Robertson (2019) with social media. The analysis was guided by the processes of grouping data into meaningful categories in a deductive manner, sorting for patterns, identifying

cases, generalising constructs and theories, and memoing with reflective remarks. It is notable that there is not a fixed order to follow. After that, the main arguments presented here were built and organised.

As collecting individual informed consent in large online communities is impossible (Whiteman, 2012; Hair & Clark, 2007), permission was asked from the administrators and participants were informed about the research via posts. As we cannot guarantee full awareness of the research in the communities, data collected from participant observation were always anonymised and stripped of any personal information, the quotes used were free translated, ensuring that they cannot be found by search engines. For the online interviews, participants were given the choice of being anonymised or having their own names used when quoted, as we wanted to value their voices. As their choices matter for their own context, we do not make it explicit whether anonymisation was used or not, except when participants had public pages that they mentioned during the interview. Our approach was approved by the University of Antwerp Ethics Committee for the Social Sciences and Humanities.

RESULTS

We chose to group our analysis around the four categories of neurodiversity given by Robertson (2009): (1) language, communication, and social interaction; (2) sensory processing; (3) motor skill execution; and (4) goal-oriented and reflexive thinking, planning, and self-regulation. Although attention was paid to all four categories, the impact in the first one was significantly higher than in the others. We will start by discussing the categories where social media seems to have the least impact and then move on to the key fields of language, communication and social interaction. We do not only discuss the positive outcomes of social media but also new vulnerabilities they bring along for autistic people, drawing on Coeckelbergh's (2013) ideas concerning vulnerabilities.

In relation to the category of *sensory processing*, much of what was mentioned in the fieldwork was related to social interaction and in line with research in the field as previously discussed (Davidson, 2008; Van der Aa et al., 2015). Both in the interviews and in the Facebook groups, people related that they are more comfortable when using digital

media to communicate because they do not feel the need to follow social expectations, such as looking at the interlocutor's face when talking or coping with external stimuli. For instance, when we were discussing the issue in the *Grupo Asperger Brasil*, one person said "I do not like face-to-face chatting because I cannot look at the other person's eyes and pay attention to the conversation at the same time". Offline he was always judged for this behaviour, but online no one would judge it. Another member added: "I hate direct social contact, but messaging is fine". Thus, the observations and interviews confirmed that, for autistic people, digital environments are more controllable in terms of sensory input. Nonetheless, we observed that most scholarship and also the words of advocates refer to the textual nature of digital communication, which has been modified along the years, becoming increasingly visual. Although none of our participants pointed this out, there is a need of further research to explore whether and how the busy visual nature of current online platforms such as Facebook affects the sensory processing skills of the autistic brain.

A second domain of neurodiversity is motor *skill execution*. However, in our observations and interviews little was said about the relation between autism and the motor skills necessary to use digital media. Only one of our interviewees mentioned that her typing abilities were judged by neurotypicals, who said she was too slow. People who mentioned it in the Facebook groups had mixed positions: some said they found typing easier than writing, while others pointed out that it was easy to make mistakes when typing or that it would depend on the device they were using (i.e. notebook or mobile). However, none of them directly associated typing with a difficulty in motor skill execution. Thompson (2016), who works with occupational therapy for autistic people, mentions that the keyboard provides more challenges for people on the spectrum as it requires the use of both hands at the same time and motor planning skills, which means the "ability to conceive, plan, and execute a skilled, motor act in the correct sequence from start to finish". Nonetheless, the use of Augmentative and Alternative Communication (AAC) is growing among non-verbal autistic people, including devices with keyboards or apps that have pre-formed sentences or illustrations (Ganz, 2011). While the use of these technologies is still being implemented in Brazil, many mothers in the Facebook communities related that their autistic kids spend a good amount of time using tablets or

computers. It is worth considering that none of the group members mentioned the use of AAC, which reflects the reality that the presence of autistic people in Brazilian communities is still limited to a narrow part of the spectrum. As digital technologies become more ubiquitous, autistic people, like neurotypicals, might develop better motor skills required to use digital media, as Moraes et al. (2017) concluded motor skills are acquired even without the awareness of the autistic individual. The necessity of using motor skills to access digital content goes hand in hand with the new vulnerability related to disembodiment mentioned by Coeckelbergh (2013): even though the digital is seen as disembodied, it is our body that mediates what happens there, which means that difficulties in motor skills might affect one's experience when using in social media.

A third category is *goal-oriented and reflexive thinking, planning, and self-regulation*, which is seen as a strength in many autistic people, as Robertson (2010) mentions they tend to "have key strengths that include detailed thinking, expansive long-term memories, a comfort with rules and guidelines, and an affinity for analysing complex patterns in the social and physical worlds", although they may have difficulties in organising multi-task activities. In our research, the main activity related to this category was the possibility of delving inside one's hyperfocus, which is the possession of an intense object of interest, via digital media and also finding people with similar interests. In the Facebook groups there were many posts asking about each other's hyperfocus and also about where to find communities to discuss such subjects, which was difficult in offline settings. In the interviews, Ana, who has a hyperfocus on photography and is an amateur photographer, said "social media allows me to express what I think and reach other people in a more efficient manner. I learn easily and share my photos daily there." Additionally, Marcelo expressed that social media allowed him to research more about the human condition, as he is deeply interested in psychiatry, neurology, and autism.

Although it is considered as a positive trait of the autistic personality, people in the online communities mentioned that they were not able to control their hyperfocus, which could lead to an obsessive search for more knowledge and, when using digital media, an excessive amount of time spent in front of screens. Another problem some people face comes up when they try to participate in groups about their hyperfocus, as communication often does not run smoothly for them. For instance, a member of *Grupo Asperger Brasil*

expressed that it was really difficult to find people to discuss his hyperfocus and that Facebook could fill this gap for a while, but he was later banned from the communities he liked because of problems in the interaction with neurotypicals, since he was really persistent when talking about his opinions. This goes hand in hand with the fact that we bring our pre-existent vulnerabilities to the realm of the digital, as also observed by Coeckelbergh (2013). Issues that would affect offline contexts can appear differently in online settings, but they are still of relevance.

We observed the main benefits of social media in the fourth category, that of *language, communication, and social interaction*, which was also impacted by the other categories (e.g. sensory input of eye contact which can be avoided online). All the interviewees mentioned that they felt more comfortable when using social media to interact with other people, some arguing that they had difficulties to express themselves orally, while others said that offline social situations gave them anxiety. Moreover, all of them said that they feel they got more friends after joining social media, although one respondent mentioned: "I feel I have more friends, but I know that it is not true", as she perceives a difference between those who added her as a friend on Facebook and offline friendships. The interviewees were also happy with the fact that they could meet other autistic people in the communities and meet them offline, although this was mostly restricted to the big Brazilian cities, such as São Paulo and Rio de Janeiro.

Members of the communities argued that it was easier for them to approach people online, either for friendship or for romantic relations, because they could express themselves better through writing and find people with similar interests to start a conversation. The improvement in social relations via social media also impacted some participants in terms of offline relations, as half of the interviewees mentioned that they believe they are better at creating and maintaining contact because they learnt how to socialise via social media. These skills are not just learnt by the act of socialising, but also by exchanging information with other autistic people and learning coping strategies. Many topics discussed in the groups are related to shared traits or how to understand neurotypical behaviours and expectations.

Although the degree of activity in *Grupo Asperger Brasil*, the group in which most participants are autistic people, decreased during participant observation, it was

noticeable how posts would sometimes flourish and lead to elaborate discussions, participants spending a lot of time to elaborate on their ideas and go beyond superficiality, showing they have great skills to express themselves. The decrease in participation in the group may be caused by the creation of other communities which were restricted to autistic people, as four interviewees mentioned they felt more comfortable in groups that were autistic only.

As autistic people have difficulties in communication and social interaction, it is expected that some of these difficulties will be transposed to online environments, despite the latter's clear benefits. Hence, it is also in this category that we could observe most of the problems regarding social media usage in our research. Both in the online groups and in the interviews, participants reported that they would get sad when people unfriended them on Facebook but also concerned when people added them as friends but did not talk to them – considering Facebook friendship as a true form of friendship. In addition, many have experienced awkward situations with colleagues because they did not understand irony in posts. For instance, one person related that he spent a great amount of time trying to explain himself in a post after being questioned, while people were laughing because the question was ironical. Another group member said she was embarrassed after a workmate made a comment, which she understood literally and replied to in that sense, but in the end, the colleague was just joking by using an idiomatic expression.

One of our interviewees, Marcelo, also reported that sometimes he was not well understood even in autism communities. He actively participates in a community in which most members are parents of autistic people and, more than once, as seen during participant observation, he was heavily criticised – although most parents were welcoming towards him. The same behaviour was observed with other autistic adults who expressed themselves in the communities with more parents, as well as instances in which parents tried to patronise autistic adults.

Moreover, during our research, some members of the group explicitly said that they were going to delete their accounts because Facebook was increasing their anxieties and making them sad, as other Facebook's users did not behave as members of the group expected. None of our interviewees mentioned internet addiction nor was it a common topic in communities (despite parents saying that their kids spend many hours in front of

tablets), but some mentioned they spent a great amount of time online. Four of the interviewees reported that they are always connected, with an estimation of more than ten hours online per day.

The aspects in this fourth category – *language, communication and social interaction* – overlap with the other three categories. For instance, members reported that they felt overwhelmed by discussions regarding their hyperfocus, which would lead to a sensory overload. Despite the fact they could leave social media, they reported feelings of sadness and anxiety when those things happened.

DISCUSSION

Digital media has affected society on a cognitive level, impacting the way we process information and deal with our surroundings. Scholars are discussing how reading and memory have changed because of the digital, some emphasising new opportunities while others lament the decay of cognitive human abilities that now rely on digital strategies to cope with a wide range of processes. For neurotypicals, digital and social media bring new cognitive possibilities, but they mostly augment and add another layer to pre-existing capabilities of communication and social interaction. However, for autistic people, digital and social media allow to explore and develop one of the key challenges that they face because of their differently wired brain. For them, the prosthetic relation does not just add to pre-existing capabilities, but it creates venues in which autistic people can be accommodated and feel comfortable to express themselves. For instance, the neurodiversity movement, which has set the pillars for a positive view of autism, has found its place and developed online. For those who are non-verbal, the prosthetic apparatus can even go beyond cognition with the use of Assistive Communication Technology, which allows them to express themselves with a language and voice comprehensible for neurotypicals.

The extended abilities offered by social media, in terms of information gathering and processing, which allow autistic individuals to explore their hyperfocus, are double-sided. On the one side, Hayles (2012) points out how they increase access to different perspectives and thus the management of the complex patterns that may suit the autistic brain. On the other side, they can lead to problems regarding excessive use of the internet,

which can lead to the development of patterns of isolation and mental illnesses, such as depression and anxiety, that are already common among autistic people (Murphy et al., 2016). Either way, positively or negatively, there is an impact on cognition processes. Nonetheless, the problem regarding attention span that was pointed out by Carr (2010) does not seem to affect the autistic brain as much as it affects neurotypicals, as they still keep their focus on their object of interest.

The fact that social media bring people together on the basis of shared interest, as does Facebook, also values autistic people as they can be seen as experts in their fields of interest, while in offline social interactions they can be seen as weirdos because of their extreme affection for one topic. By being in groups that share the same interest, they can learn socialisation techniques or even perceive when their behaviours do not follow the neurotypical rules, such as the member whose persistence lead him to be banned from communities. Although the autistic brain does not have to change and society should accommodate their differences, some find it useful to learn coping strategies to deal with others. It also demonstrates that, although Facebook as a whole has a loose system regarding norms and profile crafting, each community may still construct its own rules and expect users to behave in a certain manner.

The cognitive impact of the digital on autistic brains is not simply negative nor positive, as the vulnerabilities brought along by the digital sphere are mostly outcomes of pre-existent vulnerabilities that take on a new a new guise in cyberspace. Overall, digital technologies are resulting in brain adaptations that, in turn, can promote adaptations in how to deal with offline environments – as in the symbiotic relation with any form of prosthesis, proving the plasticity of the human brain to change itself and its surroundings. In this light, social media provides a cognitive venue in which autistic people can train and adapt their brains to develop and strength their skills.

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