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THEORETICAL ESSAY

LITERACY AND ITS CHALLENGES: PROMOTING CRITICAL THINKING IN SUBLITERATE PEOPLE

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ABSTRACT

We begin by defining the concept of literacy and illustrating its impact on cognitive abilities, in particular on memory and language comprehension. We then consider the hypothesis that literacy contributes to raising the quality and depth of critical thinking. This, in turn, supports the capacity for intellectual self-defense – in terms of cognitive science, "epistemic vigilance" – in relation to fake news and other maneuvers to distort the facts or of lying propaganda. Finally, we discuss the results of pre-tests of an experimental project in which subliterate adults will receive training in literacy and critical thinking skills.

RESUMO

Definimos o conceito de literacia e ilustramos o impacto desta nas capacidades cognitivas, em particular de memória e de compreensão da linguagem. A seguir, consideramos a hipótese de que a literacia contribui para elevar a qualidade e a profundidade do pensamento crítico. Este, por sua vez, sustenta a capacidade de autodefesa intelectual – em termos de ciência cognitiva, de "vigilância epistémica" – relativamente às fake news e a outras manobras de desvirtuação dos fatos ou de propaganda mentirosa. Finalmente, são discutidos os resultados de pré-testes de um projeto experimental em que adultos subletrados receberão treinamento das capacidades de literacia e de pensamento crítico.

KEYWORDS

Literacy; Critical Thinking; Information Disorder.

PALAVRAS-CHAVE

Literacia; Pensamento Crítico; Desordem de Informação.

INTRODUCTION

In this text, we will examine the relationship between literacy and critical thinking and present the first steps of a project in which we contemplate the possibility of promoting these abilities in subliterate people. People with low levels of literacy may have fewer tools at their disposal to doubt and use their critical thinking and this may hamper their participation and representation in democracy, among other drawbacks. This is a huge problem: I addition to people who remain illiterate because they did not attend school (there are about 758 million illiterate adults worldwide, according to the United Nations Educational, Scientific, and Cultural Organization, UNESCO, 2016), most schooled people are unable to demonstrate critical reflection on written information, as we will discuss in more detail in section 3.

However, we avoided using the term "functional illiterate" because it is ambiguous (see BULAJIC; DESPOTOVIĆ; LACHMANN, 2019; VÁGVÖLGYI *et al.*, 2016). In fact, according to some scholars, functional illiterates are those who have undergone a "normal" schooling path, at least until the end of compulsory education. With respect to our goals, it is more important to consider people who do not meet the definition of functional literacy as proposed by the UNESCO (1979, p. 18 of Annex I), namely a person displaying the "ability to engage in all those activities in which literacy is required for effective functioning of his group and community, and also to enabling him to continue to use reading, writing and calculation skills for his own and the community development". Thus, according to this definition, a functional illiterate person is someone who does not have the minimum level of competence in reading and writing necessary to deal with the complex demands of daily life and work.

In the Portuguese version of the present paper, we also preferred to use the term *literacia* (literacy) instead of *letramento*, which is more common in Brazil, because *literacia* is more comprehensive and has the great advantage of homogenizing concepts through languages (it is the term used in English – literacy –, French – *littératie* –, and in Portugal). Literacy does not correspond to alphabetic literacy because one can be a literate, in the sense of knowing how to read and write, and an alphabetic illiterate (this is the case, for example, in Japan of people who have only acquired the traditional, non-alphabetic systems, the kanji and kana).

It is in countries that use the alphabet that alphabetic literacy opens the way to literacy *tout court*, that is, to the efficient and frequent use of reading and writing in activities of acquisition, transmission, and even production of knowledge. We define literacy as "all that, in the individual or in the culture to which the individual belongs, results, has resulted or will result directly or indirectly from the development and use of the writing technology" (KOLINSKY; MORAIS, 2018, p. 322). It should also be borne in mind that the political-

economic and cultural domination of the Western world, where alphabetic writing is almost the only one to be taught during primary school, entailed that it is also taught in many Eastern countries, especially to ensure knowledge of written English.

1. LITERACY IMPACTS MENTAL CAPACITIES

Through the activities of acquisition, transmission and production of knowledge, literacy impacts many mental, perceptive, and cognitive capacities. For example, auditory verbal memory is much weaker in illiterate adults compared to literate adults (for reviews, see DEMOULIN; KOLINSKY, 2016, and, in Portuguese, GABRIEL; MORAIS; KOLINSKY, 2016). This is the case in the immediate repetition of pseudo-words (*e.g.*, CASTRO-CALDAS *et al.*, 1998; KOLINSKY *et al.*, 2018) and in the immediate serial recall of lists of words (*e.g.*, KOSMIDIS; ZAFIRI; POLITIMOU, 2011; MORAIS *et al.*, 1986), as well as in memory of word order (KOLINSKY *et al.*, 2020; SMALLE *et al.*, 2019). This is because, in literate people, auditory verbal memory benefits from the support of orthographic and metaphonological mental representations. The first type of effect was illustrated in an experimental study by Pattamadilok *et al.* (2010), who observed that if even for literate adults it is difficult to remember spoken word lists that are phonologically similar because they rhyme, this difficulty is attenuated if the rhymes correspond to orthographically dissimilar mental representations. Therefore, literate adults perform better with lists of rhyming words like "bought, squat, caught, wart, yacht" than with lists of rhyming words like "bought, thought, nought, sought, fought". The second type of effect was observed in a task of word repetition performed in difficult listening conditions. Indeed, at each trial, two words were presented jointly, one in one ear and the other in the other (dichotic listening), the task consisting of paying attention to only one, predesignated, ear, and repeating the word they thought they had perceived in that ear (MORAIS *et al.*, 1987). Compared to illiterates or subliterates, and regardless of overall performance in this task, literates made proportionally more single segment errors, especially those limited to the first consonant (*e.g.*, *mapa* instead of *capa*), and fewer overall errors, namely on all segments of a syllable (*e.g.*, *tampa* instead of *capa*). This phenomenon seems to be due to a strategic focus on phonemes. In university students, the proportion of single-segment errors varies according to an instruction that requires attention to phonemes (CASTRO, 1988), which suggests that literate (or at least alphabetic literate) people can use an attentional strategy based on explicit awareness of phonemes to facilitate their immediate recall of words. Illiterate people cannot exploit this strategy because they did not develop phonemic awareness (MORAIS *et al.*, 1979; 1986; READ *et al.*, 1986).

Literate people also use syntactic structures that are different from those of illiterates because written speech is very different from oral speech. In writing, cohesion

is established by means of complex syntactic structures that make explicit the connectives and highlight the relationships between propositions through grammatical subordination. Oral language is, on the contrary, additive and aggregative (*e.g.*, ONG, 1982). An illustration of this is the narrative of creation in Genesis, in which "and" begins almost every proposition: "And God saw the light that it was good; and he divided the light from the darkness. And he called the light Day, and the darkness Night; and there was evening and morning one day." (GENESIS 1:4-5).

Consistently, literate adults not only use structures different from those of illiterates, but these structures are different in writing when compared to spontaneous speech. Some studies offered examples of this in Brazilian Portuguese (CORRÊA, 1991; KATO; CYRINO; CORRÊA, 2009), namely in the use of a null direct object (*e.g.*, *Comprei o peixe sem examinar***ø**, "I bought the fish without examining**ø**") instead of the use of a clitic (*e.g.*, *Comprei o peixe sem examiná-**lo***, "I bought the fish without examining **it**"). Sentences with null object often occurred in the speech of university students (65%), almost as much as in the expressions of illiterate adults (68%), but were much rarer in their written texts. For the clitics, the university students also exhibited a huge difference between their oral and written productions (14 vs. 86%); illiterate adults never used them. The clitics do not appear until the last elementary school grades and, even so, rarely in the speech of the students.

Illiterate adults also have difficulties understanding spoken sentences with complex syntactic structures. For example, Scholes and Willis (1987a, b) showed that by presenting illiterates with sentences like "If a girl watching a man drawing pictures of a young boy runs away, who runs away?", 29% answered "the boy". Their understanding is based on the order and contiguity of the salient terms.

In addition, reading acquisition (as well as, more generally, formal education) increases and diversifies the "database" of the individual's knowledge. This is because reading is a mindtool that facilitates access to information and acquisition of new knowledge. In addition to extracurricular reading, exposure to school textbooks is already an important source of vocabulary enrichment. Many encyclopedic terms related to academic knowledge are rarely used in oral language (*e.g.*, "Uranus", "vector"). A French study (LIEURY; LORANT, 2013) showed that the acquisition rate of such terms doubles approximately every year between the sixth and ninth grade: 2500 new words of this type are acquired at the end of the sixth grade and 17000 at the end of the ninth grade! Thus, literacy increases the richness and accuracy of concepts, for example the knowledge of taxonomic specimens. This effect has been demonstrated through a task of semantic fluency task, which requires, for example, saying as many animals as possible in two minutes. In this task, illiterate and subliterate adults have much fewer responses compared to the literates, as a function of their level of literacy (*e.g.*, KOLINSKY *et al.*, 2014).

2. LITERACY AND CRITICAL THINKING

Since literacy has a positive effect on memory and understanding of language, does it contribute to raising the quality and depth of critical thinking? In addition to "basic" (literal) understanding in reading, there is the possibility for the reader to put the ideas conveyed by the text in relation to his or her knowledge, so that he or she can make assumptions about the text and evaluate it critically.

However, according to the PISA survey, which assesses the reading comprehension of 15-year-olds in Organization for Economic Cooperation and Development (OECD) countries and a few others, most 15-year-olds are unable to demonstrate critical reflection on written information. They are able to locate one or more pieces of information, building meaning into a limited part of the text (PISA level 2), but have difficulties in understanding more than its literal meaning, in processing unexpected ideas or in categorizing information.

According to the 2018 PISA survey (OECD, 2019), readers below level 3 of PISA are about 46% in the OECD countries on the average, and about 74% in Brazil. PISA level 4 is characterized by being able to read and understand the meaning of a relatively long text and relate it to one's own knowledge in order to be able to make hypotheses about it, make some inferences and evaluate it critically. It has been reached by only about 19% of adolescents in the OECD countries on the average, and by about 7% of Brazilian adolescents. Level 5, which already requires in-depth understanding, evaluation of the coherence between various statements and critical reflection on written information, was reached by less than 10% of adolescents in the OECD country on the average, and only by about 2% of Brazilian adolescents.

3. INFORMATION DISORDER

Given the low proportions of young people capable of critical reflection on written information, there are grounds for alarm in general and in Brazil in particular. Beyond the hazards of personal life, this situation is very problematic in a world where misinformation, fake news and mystical or conspiracy theories abound. This is because critical thinking is the bedrock of intellectual self-defense – or, in terms of cognitive science, epistemic vigilance – in relation to fake news, conspiracy theories and other distorting maneuvers or misleading propaganda, which represent various types of "information disorders" (WARDLE; DERAKHSHAN, 2017).

Fake news are news that can fool readers, but whose falsehood is theoretically easy to check. They appear in intentionally manufactured articles, or originate from satirical sites, but can be understood as factual, especially when viewed out of the original context (on

Twitter, Facebook, WhatsApp, etc.). A famous example is the hoax (a lie deliberately fabricated to masquerade as the truth) produced by the fantasy news site "WTOE 5" (now deactivated), according to which "Pope Francis shocks the world and endorses Donald Trump for president". This news, obviously false (because it had no basis in reality), became viral on the Internet at the time of its publication (July 2016): it has been posted or shared almost a million times, and is estimated to have been seen by tens of millions of people (SILVERMAN, 2016). Such fake news can undermine the quality of public debate, promote misperceptions, foster greater hostility against political opponents, and undermine confidence in government and journalism (GUESS; NYHAN; REIFLER, 2020). This is also the case in Brazil, where fellow congressmen who support the president Bolsonaro have been investigated since April 2020 by the Federal Police for threats, offenses and fake news disseminated against members of the STF (*Supremo Tribunal Federal*, the Federal Supreme Court, the highest instance of the Brazilian judiciary) and their families.

Conspiracy theories refer to beliefs about a group of actors who join together in secret agreement to achieve a hidden goal that is perceived as unlawful or malevolent (ZONIS; JOSEPH, 1994). Unlike fake news, they are, by definition, difficult to verify as true or false, and are usually conveyed by people who believe them to be true. Conspiracy theories are characterized by pseudo-demonstrations through the addition of arguments, by the willingness to accumulate evidence in order to constitute argumentative *mille-feuille* of apparent impressive solidity. They are built through a narrative in which the true and the false are difficult to differentiate (BRONNER, 2013).

As recalled by Douglas *et al.* (2019), conspiracy theories, although often considered as specifically directed at governments, can accuse any group perceived as powerful and malevolent. Conspiracy theories about the September 11 terrorist attacks have accused the Bush administration, the Saudi government, corporations, the financial industry and the Jews; conspiracy theories about climate change have accused scientists, communists, the United Nations, democrats, the government and the oil industry, among others. And the so-called Big Pharma's conspiracy theories claim that the pharmaceutical industry, especially large companies, operate based on claims against the public interest. While a conspiracy refers to a true causal chain of events, a conspiracy theory refers to an allegation of conspiracy that may or may not be true.

As for the term "conspiracy belief", it refers to the belief in a specific conspiracy theory, or a set of such theories, whether true or not. In fact, recent studies have suggested that people have (or have not) an underlying general tendency to prefer conspiracy explanations (*e.g.*, BROTHERTON; FRENCH; PICKERING, 2013; USCINSKI; PARENT, 2014), that is, they have (or have not) "conspiracy predispositions". Indeed, it has been observed that people who already believed in one conspiracy theory are more likely to believe in others (GOERTZEL, 1994), even unrelated or mutually incompatible. For example, Wood *et al.* (2012)

showed that the people who most believed that Princess Diana was faking her own death also most believed that she had been murdered. Similarly, the more they believed Osama bin Laden was already dead when US special forces raided his compound in Pakistan, the more they believed he was still alive.

The COVID-19 pandemic was and still is a "Petri dish" for conspiracy theories and fake news (*e.g.*, ELLIS, 2020). Most of these conspiracy theories are based on the idea that the new virus would actually be a biological weapon created by the US or China (at this point each one chooses the narrative they like best) to destabilize the economy of their commercial rival (GERTZ, 2020). This idea is still very much alive, although it has been widely refuted and unmasked since mid-March 2020: A study published in the prestigious scientific journal "Nature Medicine*"*, based on comparative analysis of genomic data (we recall that SARS-CoV-2 is the seventh known coronavirus that infected humans), concluded that the SARS-CoV-2 virus can only have evolved naturally and that it is not a laboratory construct or a purposely manipulated virus (ANDERSEN *et al.*, 2020).

Unfortunately, many people believe in such theories. In a survey conducted between May 4 and 11, 2020 by Oxford University in the United Kingdom, 2500 adults representing the English population in age, sex, region, and income were interviewed (FREEMAN *et al.*, 2020). Among them, almost 60% believed to some extent that the government is deceiving the public about the cause of the virus. About 60% also believed that the virus was created by man, and about 20% considered it a hoax.

Brazilian diplomacy itself is full of "conspirationism". To illustrate this with just one example (there are thousands, as well as of fake news, see BASILIO, 2020; https://www.aosfatos.org/todas-as-declara%C3%A7%C3%B5es-de-bolsonaro/; https://www.cartacapital.com.br/politica/retrospectiva-as-piores-declaracoes-de-bolsonaro-durante-a-pandemia/?utm_campaign=novo_layout_newsletter_-_28122020&utm_medium=email&utm_source=RD+Station), Brazilian Foreign Minister Ernesto Araújo published a text on his Twitter feed on 22 April 2020 as well as on his personal blog, in which he said the coronavirus pandemic is being used to implement a communist plot, which he calls "communavirus". The pandemic, together with its containment measures, would be part of a communist machination, which fits well with the Bolsonarist view according to which "the communists" (or "*PT* members" – *PT*, the *Partido dos Trabalhadores*, "Workers' Party", being a leftist Brazilian political party) are enemies of the nation, of the "citizen of good" (*cidadão de bem*), in a clear simplification of political conflicts, often expressed in pseudo-religious terms (or "christofascist" view, *e.g.*, PY, 2020). According to this conspiracy theory, communism will take advantage of this moment of sanitary crisis and of appeals for solidarity to implement its ideology through the strengthening of international entities such as the World Health Organization (WHO).

These various conspiracy theories, as well as thousands of fake news about COVID-19, have led the WHO to fight, since February 2020, a pandemic beyond the coronavirus: an "infodemic" (ZAROCOSTAS, 2020). In fact, in general, belief in fake news or conspiracy theories has serious consequences for society, because of its detrimental implications for both political participation and climate change (e.g, encouraging people to reject the scientific consensus around anthropogenic climate change, JOLLEY; DOUGLAS, 2014) and public health (*e.g.*, OLIVER; WOOD, 2014). Thus, they incite many people to reject conventional medicine and vaccines to the extent that once cured or even disappeared diseases are now reappearing in many parts of the world. By 2020, those who believed in conspiracy theories about COVID-19 were less likely to comply with government directives that encourage proper precautions against the virus (staying at home, not meeting people outside the home, or staying away from other people when they have been contaminated) as well as less willing to do a diagnostic test or be vaccinated in the future (FREEMAN *et al.*, 2020). In Brazil, the multiplication of fake news, lies and conspiracy theories against COVID-19 vaccines led to an increase in the percentage of people who do not want to get vaccinated (from 9% to 22% between August and December 2020, according to the polling institute Datafolha, 2020). Reports range from the fear of having a chip implanted in the brain to the possibility of contracting cancer or HIV. And in December 2020, criticizing laboratories that do not take responsibility for collateral effects of the vaccine, Bolsonaro's declared that "if you become an alligator, it is your problem", and continued: "If you become Superman, if any woman was born with a beard there (...), they have nothing to do with it.". This contributes to cast doubts and impact the population's intention to get vaccinated. Fake news can also encourage the use of drugs that have no proven effect. Thus, in a survey in which 2000 Canadians were interviewed between May 5 and 8, 2020 (EVERTS, 2020), almost one in four respondents (23%) believed the statement that hydroxychloroquine is effective in the treatment of patients infected by COVID-19. That the medicine was advertised by former President Donald Trump and by President Jair Bolsonaro as a cure for the disease, may already be grounds for suspicion, as none of them has medical formation, and both willingly use misinformation, fake news and conspiracy theories. More essentially, there was a lack of scientific evidence of its effectiveness against COVID-19, as it was still being studied; and 17% believed that regularly washing one's nose with saline solution helps to protect from infection, which is also not supported by public health professionals. Fake news and promises of miracle cures can also give the impression that isolation and quarantine are not necessary. This, together with the Heads of State's denial of the seriousness of the disease caused by the coronavirus themselves, has serious consequences for public health.

Equally worrying is the possibility that conspiracy theories contribute to radicalization and extremism. Bartlett and Miller (2010) as well as Van Prooijen, Krouwel and Pollet (2015) analyzed several extremist groups and noted that conspiracy theories are not only prevalent in these groups, but that there is a great similarity between the conspiracy theories mentioned by groups belonging to the opposite extremes of the political spectrum. For example, Bartlett and Miller discovered that the theories of the anti-Jewish capitalist conspiracy were characteristic of both the right-wing and left-wing extremists.[1] Although it would be very difficult to demonstrate direct causal links between conspiracy theories and extremism, Bartlett and Miller (p. 4) argued that these theories play an important social and functional role for extremist groups: they would be a "radicalizing multiplier" that feeds and reinforces ideologies, internal dynamics, and psychological processes within the group, maintaining the group's unity and pushing it in a more extreme, and sometimes violent, direction. In addition, Van Prooijen *et al.* showed that the participants' belief in simple political solutions to society's problems was at the root of conspiracy beliefs among both left and rightwing extremists.

Content analyses of publications by radical networks have shown that conspiracy theories are rarely used openly to justify extremist political action. Instead, these groups use them to create the ideological conditions for extremism and political violence. This is the case, for example, with the Counter-jihad movement, which presents itself as an opposition to the Islamization of the West, infusing fear of Muslims and a radical distrust of leaders and political institutions that are represented as either accomplices of Islamists or their fools (*e.g.*, LEE, 2017). It is important to remember that these beliefs (and this Counter-jihad movement) inspired, for example, the Oslo bomb attack and the massacre of left-wing youth on the island of Utøya by the Norwegian terrorist Anders Breivik in 2011 (FEKETE, 2012), with a sinister total of 77 dead and many injured.

In general, belief in conspiracy has been linked to violent intent. Uscinski and Parent (2014) conducted a national survey in the United States, in which they showed that participants more inclined to conspiracy theories were also more likely to agree that "violence is sometimes an acceptable way to express disagreement with the government" than those less inclined. As discussed by Douglas *et al.* (2019), those prone to believe in conspiracy are also favorable to lax gun ownership laws (USCINSKI; PARENT, 2014), show greater willingness to conspire (DOUGLAS; SUTTON, 2011) and stronger intent to engage in everyday crime (JOLLEY *et al.*, 2019). Although no research is able to demonstrate a causal

1 Yet, this does not imply symmetry in conspiratorial thinking. On the contrary, a recent study including very large samples of thousands of adults (VAN DER LINDEN *et al.*, 2020) showed that, at least in the United States, conservatives are more likely than liberals to endorse conspiracy theories. Likewise, conservatives endorsing ideologies favoring hierarchical social stratification, termed "social dominance orientation", are more willing to spread COVID-19 conspiracy-themed misinformation on social media (LOBATO *et al.*, 2020).

relationship between conspiracy theories and violent intent, there have unfortunately been several cases of people committing violence based on conspiracy ideas. In a recent study, Jolley and Patterson (2020) show this to be the case in relation to belief in "5G COVID-19 conspiracy theories", namely in a link between 5G mobile technology and COVID-19: people who endorse such theories are more likely to find violence (*e.g.*, against 5G towers) legitimate and to report a willingness to engage in similar behaviors in the future. Anders Breivik is thus not an isolated case, and it happens that governments also commit violence based on conspiracy theories and propaganda. In the past, this happened, for example, in Nazi Germany, in Stalin's Russia, and today it is happening in Bolsonaro's Brazil.

It is also important to remember that in several countries, such as Brazil, political misinformation can even prevent society from functioning properly, by weakening or destabilizing the main civilizing institutions, a situation that was called "infocalypse" (apocalypse of information) by Aviv Ovadya, founder of the "Thoughtful Technology Project" who predicted the crisis of fakes news in the American presidential elections of 2016.

This is illustrated by the Brazilian management of the COVID-19 pandemics. Because he fears the political consequences of the economic crisis that would result from public health measures such as physical distancing and lockdown, as well as because he is aware that he lacks the military's support to transform Brazil into a dictatorship, Bolsonaro did not use the coronavirus to consolidate his power, repress society and his detractors, or strengthen digital surveillance (ORTEGA; ORSINI, 2020a), as has been the case for instance in Hungary, Philippine, Israel, India, China, South Korea and Russia. Yet, these countries' governments did not deny scientific evidence (ORTEGA; ORSINI, 2020a). In contrast, the Bolsonarist approach to the COVID-19 pandemic is characterized by mistrust of science and denial of scientific evidence, and, more generally, "denialism" (also called "viral denialism", *e.g.*, VERAS, 2020), namely the use of rhetorical arguments to give the appearance of legitimate debate where there is none, which has the ultimate goal of rejecting a proposition on which a scientific consensus exists (DIETHELM; MCKEE, 2009). This is implemented by systematically downplaying the severity of the pandemic (*e.g.*, in March 2020, Bolsonaro called COVID-19 a "little flue" – *gripezinha* – what he later denied), neglecting the alerts from scientists from all over the world, disseminating fake news and conspiracy theories that support, among others, the rejection of appropriate public health measures and instigate the adoption of pseudo-cures, as we already commented on. The Bolsonarist approach also capitalizes on "bullshitting" (FRANKFURT, 2005), totally disregarding factual truth or falsity and seeking only the obtained impression (*e.g.*, BRUM, 2018). It also relies heavily on "strategic ignorance", namely strategic mobilisation of ignorance linked to nonaction or inaction as a form of power (MCGOEY, 2019; ORTEGA; ORSINI, 2020b).

Consequently, an editorial of one of the world's leading medical journals has depicted Bolsonaro's threat to Brazilian public health as "perhaps the biggest threat to Brazil's

COVID-19 response" (THE LANCET, 2020, p. 146). The same journal has also published a paper recognizing serious institutional risks resulting from the federal government's actions (BARBERIA; GÓMEZ, 2020; see also OSBORN; 2020). And an article published in a famous global health journal was titled "Governing COVID-19 without government in Brazil: Ignorance, neoliberal authoritarianism, and the collapse of public health leadership" (ORTEGA; ORSINI, 2020b; see also VENTURA; MARTINS, 2020). In fact, in spite of the strong expansion of COVID-19 in Brazil[2], it would be erroneous to consider the country's inadequate response to the pandemic as an expected outcome, given its economic and political specificities. On the contrary, Brazil has been considered the best prepared developing country to face this kind of emergency (VENTURA; MARTINS, 2020). The Global Health Security Index of Johns Hopkins Bloomberg School of Public Health (NUCLEAR THREAT INITIATIVE, 2019) ranked Brazil 22nd on the overall score among 195 countries in terms of health security, between Japan and Ireland and far above Italy, for instance; 16th on the "prevention of the emergence or release of pathogens"; 12th on "early detection and reporting for epidemics of potential international concern"; and 9th on "rapid response to and mitigation of spread of an epidemic", just after Portugal and before Australia and Singapore. More generally, unlike many countries in the Global South, since 1990 Brazil had a well-structured Unified Health System (Sistema Único de Saúde, SUS) with nearly universal access to health care services. Yet, these last years, SUS suffered dismantling and privatising, in particular during the tenure of Michel Temer, who rose to power after President Dilma Rousseff was impeached in 2016. As noted by Ortega and Orsini (2020b), attacks on SUS have intensified under the Bolsonaro government, with threats of further privatisation, including important setbacks in primary health care, mental health and Indigenous health. In addition, in the midst of the COVID crisis, Bolsonaro fired two Ministers of Health, Luiz Henrique Mandetta and Nelson Teich, both medical doctors, after disagreeing over social distancing measures and the use of hydroxychloroquine as a COVID-19 treatment (GRANATO, 2020; UOL, 2020); Bolsonaro then appointed Eduardo Pazuello, a Divisional general of the Brazilian Army with no medical experience at all. In addition, he took legal actions to override the decisions of the state governors who determined public health policies and enacted executive orders to halt the restrictions that are highly recommended by the scientific community, thereby creating a divide with serious tensions between federal and state powers (*e.g.*, DELLA COLETTA *et al.*, 2020). To our knowledge, as a result, Brazil is the only country in the world that has declared an end to the containment measures that some states have tried to implement.

2 In this country with more than 210 million inhabitants, according to official data (Covid-19: Painel Coronavírus) the disease has reached more than seven million people and has caused over 190 thousand deaths as of December 31, 2020, and there are numerous additional unreported cases (*e.g.*, VEIGA E SILVA *et al.*, 2020).

More generally, Brazilian science policy is also undergoing an unprecedented attack in the country's recent democratic history, due to continuous funding cuts to public higher education and research institutions, including already granted scholarships (*e.g.*, HERINGER, 2020). Scientific institutions are also being undermined from within, as illustrated by the fact that Bolsonaro appointed a creationist, Benedito Guimarães Aguiar Neto, as the head of CAPES Foundation, which is Brazil's most important agency for regulation and funding of science and high education. Not to mention the countless attacks on important institutions such as the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística*, *IBGE*), the agency responsible for official collection of statistical, geographic, cartographic, geodetic and environmental information in Brazil.

Taken together, these policies preclude any reasonable plan to deal with current and future health emergencies (e.g., VENTURA *et al.*, 2020). They are typical of the "illiberal" strategy that seeks at undermining the political institutions from within by making them unresponsive to their own justifying purposes, which is a "carefully planned attempt to undermine Rawlsian public reason by changing the forms of action of liberal institutions" (BUSTAMANTE; MEYER, 2020). In agreement with this view, the COVID-19 pandemic is far from being the only public health domain attacked by the Bolsonarist government. For instance, the Minister of Women, Family and Human Rights, Damares Alves, an evangelical pastor who has described herself as "terribly Christian", defends sexual abstinence to reduce teenage pregnancy rates, much in the same way as US former President Donald Trump. Despite the fact that research has conclusively demonstrated that programs promoting sexual abstinence-only are ineffective, she cited dubious studies to support her claim (PHILLIPS, 2020). Bolsonaro and Brazil's health ministry are also trying to censor a health education booklet for teenage girls (*caderneta de saúde da adolescente*) after Bolsonaro condemned the pages detailing female sexual organs and how to use a condom. This in a country in which teenage pregnancy rate remains persistently much higher than the world average (THE LANCET, 2020), and that recently saw an important increase of the number of young people infected by the HIV virus (SECRETARIA DE VIGILÂNCIA EM SAÚDE, MINISTÉRIO DA SAÚDE, 2020). Alias, another instance of regressive policies that undermine Brazilian public health is the dismantlement of the National AIDS Program and the shakeup in the Ministry of Health that resulted in the word "AIDS" being erased from the previously named "Department of Sexually Transmitted Infections, AIDS and Viral Hepatitis". According to Ortega and Orsini (2020b), folding HIV/AIDS in a new structure called Department of "Chronic Conditions and Sexually Transmitted Infections" could be described as a form of ignorance, or "organized forgetting" (KINSMAN, 2018). As Parker (2020, no page) adds, "removing the name AIDS from the new department's title was seen

as both silencing the AIDS movement and effectively burying the once prestigious Brazilian model for the response to HIV and AIDS under a blanket of conservative values".

According to several scholars, all these measures (or absence of measures) illustrate "chaos as method" to maintain followers' loyalty and spread disinformation (e.g., CESARINO, 2020; MEYER; BUSTAMANTE, 2020; NOBRE, 2019; SILVA, 2020). Other scholars insist on the fact that it is part of a "necropolitical" strategy, a "necropower" as defined by the Cameroonian philosopher and political theorist Achille Mbembe (2006), himself inspired by Foucault's (1976) notion of biopower. The concept includes the right to impose social or civil death, the right to enslave others and many forms of political violence, both ancient and contemporary. To explain this concept, Mbembe rethinked the question of sovereignty and defined it as the power to exercise control over mortality. Under such a view, living or dying because of the COVID-19 pandemic is the result of a deliberate policy, in which a selected part of the population is sacrificed, with the excuse of saving the economy. It is in this context that the federal government launched the campaign "Brazil cannot stop" (*O Brasil não pode parar*) on TV and social networks, which encouraged the return of face-to-face work and the adoption of minimum prevention measures against the pandemic (hand washing, quarantine for elderly people, *e.g.*, MESQUITA; BEZERRA, 2020). Fortunately, the STF banned such campaign, indicating that, on the contrary, the government should strive to save lives.

Because of Bolsonaro's cynical obsession with the economic consequences (and related political perils) rather than with the loss of life caused by the pandemic, many Brazilians are taking considerable risks for their own lives. The governments measures (or lack of measures) also have pernicious effects on the most socially and economically vulnerable, namely Indigenous communities and *quilombolas*, namely Black communities of Afro-Brazilian descendants of slaves who had fled slavery to create small settlements (*quilombos*), and, more generally, poor people (BAQUI *et al.*, 2020; Coelho-Junior *et al.*, 2020; POLIDORO *et al.*, 2020; RAVI, 2020; RIBEIRO *et al.*, 2020). As regards indigenous communities and quilombolas, it is worth remind that these isolated communities lack medical facilities, doctors, and basic medication. The National Organization of Black Rural Quilombola Communities (*Coordenação Nacional de Articulação de Quilombos*, *CONAQ*) reports a lack of testing for these communities and under-notification, as well as lack of food baskets to guarantee social distance and difficulties in accessing emergency government assistance (MEGULHÃO, 2020; VALENTE, 2020). As Ortega and Orsini remind us (2020b), in April 2020, the Federal Public Prosecutors Office (*Ministério Público Federal*, *MPF*) requested emergency measures to protect Indigenous peoples in the face of the COVID-19 crisis, speaking about the "risk of genocide" and recommending a series of measures such as making hospital beds available, providing testing kits, emergency transport, access to food and transfer of resources to municipalities with Indigenous

residents. On June 30, 2020, a petition authored by the Articulation of Indigenous Peoples of Brazil (*Articulação dos Povos Indígenas do Brasil*, *APIB*) and left-wing parliamentarians was filed at the Supreme Court, calling on the government to implement an emergency plan to protect Indigenous people from the pandemic (INSTITUTO SOCIOAMBIENTAL, ISA, 2020). On the same day, Bolsonaro instructed the military to distribute chloroquine tablets to Indigenous Yanomami communities in Roraima (PORTAL RORAIMA, 2020). One week later, he blocked part of a bill that would have required the government to provide drinking water, hygiene and hospital beds to Indigenous people to prevent the spread of COVID-19 in the villages (CARVALHO, 2020).

Bolsonaro has made no secret of his views of Indigenous and Black communities. In April 2017, the then federal deputy and presidential candidate Bolsonaro claimed at a public event (a talk at the Hebraica Club in Rio de Janeiro) that *quilombolas* were parasites who "do nothing", and "are not even fit for breeding," and compared them to animals that weigh at least "seven arrobas[3]". He also commented on the fact that foreign interference in Indigenous Lands and environmental protection hampers the country's progress. No wonder, then, that he appointed a racism denier, Sérgio Camargo, as the head of the Palmares Cultural Foundation, the Brazil's most important agency protecting black people's rights and culture. Similarly, he provisionally delegated the task of identifying and demarcating indigenous lands in the country to the Ministry of Agriculture, headed by the so-called "poison muse ("musa do veneno"; FOLHA DE SÃO PAULO, 2018) Tereza Cristina da Costa, who unrestrictedly supports the pesticides industry (*e.g.*, BONILLA, 2020; BUSTAMANTE; MEYER, 2020)[4]. The dismantling of the state apparatus that promotes public policies and the enforcement of laws that guaranteed rights to traditional populations is thus underway. As discussed by several authors, this reveals "a true 'necropolitics' (...) directed at this population segment, articulating forms of 'make die' and 'let die', of genocide and neglect" (FAGUNDES, 2020, p. 7; see also PELE, 2020). The effects of these politics and, more generally, of negligence (POLIDORO *et al.*, 2020) have been tragic (ORTEGA; ORSINI, 2020). For instance, according to a survey conducted by CONAQ and published on December 5, 2020, the mortality rate by Covid in quilombolas in the North Region reaches 11,5%, three times higher than the national average (MOURA, 2020; see also CARVALHO, 2020).

Although these "marginalized" populations are the main victims, the Bolsonarist necropolitics also affects much larger segments of the Brazilian population. As it does in other countries, mortality rates due to the pandemic differ by geographical region and

3 Arroba is a Portuguese unit used to weigh cattle and pigs. In weight it is roughly equal to 32 pounds (15 kg).

4 This task was previously under the responsibility of another, independent institution, the FUNAI, the National Foundation for Indigenous Peoples.

ethnicity, with disproportionate impact in Rio de Janeiro and the North Region, for Black populations and other ethnic minorities (HAYWOOD *et al.*, 2020; RAVI, 2020) and, more generally, for poor people (BAQUI *et al.*, 2020; RAVI, 2020; RIBEIRO *et al.*, 2020). Hospitalized patients of these populations have higher risk of death from COVID-19. Beyond a higher prevalence of comorbidities in the poor, including overweight and obesity, which are risk factors for severity of symptoms of COVID-19, there are several other factors at play (*e.g.*, BAQUI *et al.*, 2020; RIBEIRO *et al.*, 2020). Shortage of doctors and intensivists, precarious epidemiological surveillance, poorer network of health services, hospital beds, and number of intensive care units per inhabitant characterize the North Region. In addition, in both the north region and the shantytowns (*favelas*) where the poor live in Rio, ambulance access is difficult. The poor in the suburbs also suffer precarious and very crowded public transportation, facilitating transmission of respiratory pathogens, and many low-income families live in overcrowded housing, which also favors transmission. Additionally, a substantial proportion of the poor has difficulty in adhering to the simplest prevention recommendation of hygiene, such as washing hands, because their neighborhoods are not served by piped water. Also, the poor work mainly in unstable jobs with no sick leave, and thus are likely to postpone going to health services until disease symptoms are acute. Finally, lower schooling among the poor might threaten the comprehension of risks and measures proposed by sanitary authorities, as well as judgment of the right time to seek medical assistance. As we will next comment on, poor education also jeopardizes critical thinking and the ability to resist information disorder.

4. RELATIONSHIP BETWEEN EDUCATION, LITERACY, AND CRITICAL THINKING

At the cognitive level, whatever the specific type of information disorder, the fight against the distortion of facts or lying propaganda requires critical thinking. Therefore, it is crucial to remember that a significant relationship has often been observed between people's poor formal education level and, therefore, poor literacy level, and their irrational beliefs. This is the case for superstitions (*e.g.*, beliefs in the power of luck charms such as a mascot or a talisman, MOCAN; POGORELOVA, 2017), beliefs in various paranormal phenomena such as extraordinary life forms and witchcraft (e.g, AARNIO; LINDEMAN, 2005), in conspiracy theories (*e.g.*, DOUGLAS *et al.*, 2016; FREEMAN, BENTALL, 2017; MANCOSU; VASSALLO; VEZZONI, 2017; VAN PROOIJEN, 2017; USCINSKI; PARENT, 2014) and in fake news. Indeed, in a survey of 1200 people on the 2016 U.S. elections (ALLCOTT; GENTZKOW, 2017), it was

observed that formal education and total media consumption[5] are associated with people's ability to discern facts from fiction, allowing them to better distinguish whether the headlines are true or false.

There are several factors associated with education that allow us to understand how and why irrational beliefs are associated with poor formal education. In short, more educated people (i) read more and have more access to information, (ii) have a greater tendency to use analytical reasoning processes and less tendency to use simple and intuitive solutions to understand social situations and complex problems, and thus, (iii) have less tendency to attribute intentionality and agency to inanimate objects (anthropomorphism), and (iv) have greater motivation to form beliefs based on logic and evidence (e.g, DOUGLAS *et al.*, 2016; MANCOSU; VASSALLO; VEZZONI, 2017; VAN PROOIJEN, 2017). Some studies have also shown a direct relationship between critical thinking ability and literacy (in poorly performing college freshmen, FARLEY; ELMORE, 1992) or media literacy, defined as the ability to understand, analyze, and evaluate media messages presented in a wide variety of ways (in undergraduate students, ARKE; PRIMACK, 2009).

However, poor education is not the sole factor explaining information disorder: cultural beliefs and ideology also intervene. People tend to see the world in a manner consistent with their beliefs, including their political views. One mechanism that can explain this is "motivated reasoning" (KUNDA, 1990): motivation, namely any desire or preference concerning the outcome of reasoning, can affect reasoning through a set of biased cognitive processes such as access, construction and evaluation strategies. As Myers (2019) reminds us, reflecting on the logic experiments that demonstrated a "confirmation bias" (the human tendency to seek confirmatory evidence), Paul Wason (1981) had already concluded that "ordinary people evade facts, become inconsistent or systematically defend themselves against the threat of new information relevant to the issue". Thus, having formed a belief - that climate change is real (or not), that gun control saves (or not) lives, that one can (or not) change one's sexual orientation - people tend to selectively expose themselves to information that will confirm their beliefs, a phenomenon called "selective exposure". This results in a selective pattern of learning in which believers have higher levels of knowledge of the facts that confirm their worldview, and lower levels of knowledge of the facts that challenge it, especially on high-profile media issues (*e.g.*, JERIT; BARABAS, 2012). In other words: People filter events and circumstances through the lens of their predispositions, including partisanship and political ideology. Therefore, as Myers (2019)

5 The authors asked about 2016 election news consumption, including time spent on reading, watching, or listening to election news in general and on social media in particular, and the most important source of news and information about the 2016 election (print, TV, radio, websites, social media).

comments, conservative American liberals who value the unregulated free market may be "motivated" to ignore evidence that government regulations serve the common good, that gun control saves lives, that wages that allow for decent housing and social security support human growth, and that future generations need regulations that protect the climate.

Motivated reasoning is closely related to self-justification: The brain is a very powerful self-justifying machine (LEVITIN, 2017), and so to believe is also to justify one's own beliefs. In addition, people justify their past actions or beliefs to reduce "cognitive dissonance", which occurs when a person holds contradictory beliefs, ideas, or values (FESTINGER, 1957). This is illustrated by an American national research around the Iraq war reported by Myers (2019). When the war began, four out of five Americans supported the war on the assumption that Iraq had weapons of mass destruction (WMD), although only 38% said the war would be justified even without such weapons. When the war ended without any discovery of WMD, 58% began to justify the war even without such weapons. Indeed, having committed to a specific position in relation to the war in Iraq can be considered as a public action. When the action lacks its original justification (i.e., the presence of WMD), a feeling of "cognitive dissonance" is aroused. To resolve this uncomfortable feeling, people may either renounce their actions (which can be socially costly) or find new justifications (which is much easier).

Even worse: motivated reasoning also leads people to selective exposure to fake news that reinforce their political views. Guess *et al.* (2020) showed that during the U.S. presidential election in 2016, less than half of Americans visited unreliable computer sites, which accounted for approximately 6% of people's online news consumption. The news consumption of these sites was strongly concentrated in a small subset of people: almost 60% of all visits to fake news websites came from the 10% of people with the most conservative information consumption. Similarly, people who indicated that they supported Trump were much more likely to visit unreliable sites (especially conservative and therefore probably pro-Trump sites) than supporters of the Democrat candidate.

Part of the respondents to the study by Guess *et al.* (2020) also responded to the "Cognitive Reflection Test" (CRT, FREDERICK, 2005). This validated test measures the ability to inhibit a prepotent incorrect response and engage in additional reflection that leads to the correct response. The best-known item of CRT is the following: "A bat and a ball cost $1,10 in total. The bat costs $1 more than the ball. How much does the ball cost?" Many people give the first answer that comes to their mind - 10 cents - without thinking anymore and without realizing that this cannot be right. The bat would then have to cost $1,10, and the total cost would be $1,20, not $1,10. As Kahneman and Frederick (2002) commented, the occurrence of a poorly prepared initial response that should be overturned fits well with the so-called dual process theories (*e.g.*, KAHNEMAN, 2011; STANOVICH, 2011) according to which we tend to use quick strategies that do not consume

much attention rather than mental operations that require effort, motivation, concentration, and the enforcement of learned rules.

Previous studies had shown that performance in CRT is associated with the ability to distinguish between fake news and real news (PENNYCOOK; RAND, 2019). In the study by Guess *et al.* (2020), respondents who visited unreliable sites had a lower score on the CRT. More precisely, Trump supporters who did not correctly answer any CRT questions were larger consumers of news from unreliable sites than those who answered at least two of the three questions correctly. These results suggest that people who read more news from unreliable sites are also more likely to believe this type of information. Now, blind credulity is the enemy of critical thinking, and vice versa.

5. WHAT IS CRITICAL THINKING?

Considered a key element to be fully functional in our modern and complex society and a fundamental requirement to participate actively in social and political circles, the ability to think critically has been the focus of numerous debates. Thus, the concept of critical thinking has been expressed in various ways since the book "Democracy and education" by the philosopher, psychologist, and educator John Dewey (1916). He proposed that critical thinking involves "suspension of judgement" and "healthy scepticism". Ennis (1962) suggested the notion of reflexive, reasonable, thinking directed towards what to believe or do. He views critical thinking as "the correct assessing of statements". However, according to several researchers, critical thinking is more than a set of cognitive skills such as analytical capacity, inference, evaluation, and deductive and inductive reasoning. It would be a composite of cognitive abilities and dispositions, as well as knowledge (*e.g.*, WATSON; GLASER, 1980). "Dispositions", also often called "attitudes", are behavioral tendencies that concern thinking, such as the tendency to give time to think, openness and impartiality, inquisitiveness (zealously seeking evidence), flexibility, the propensity to seek reasons, the desire to be well informed, as well as respect for and the willingness to maintain various viewpoints and to consider broader perspectives (see further discussion in, *e.g.*, PERKINS *et al.*, 1993).

The notion of disposition to think critically was incorporated into the definition of critical thinking offered in 1990 by the Philosophical Association of the United States, which at the time was concerned with the multiplicity of definitions of critical thinking and therefore convened an interactive panel of experts to work towards consensus on the role of critical thinking in educational assessment and instruction. Led by Peter Facione, a prominent philosopher in the field of critical thinking, the panel presented the following definition: "We understand critical thinking to be purposeful, self-regulatory judgment which results in

interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based. CT is essential as a tool of inquiry. As such, CT is a liberating force in education and a powerful resource in one's personal and civic life. While not synonymous with good thinking, CT is a pervasive and self-rectifying human phenomenon. The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit." (FACIONE, 1990, p. 3; CT stands here for "critical thinking").

However, there is not much evidence to support the idea that people with good dispositions of critical thinking would demonstrate better critical skills than others: in several studies, the correlations between dispositions of critical thinking and critical thinking skills are quite weak, or even non-existent (for discussion, see FACIONE; FACIONE; GIANCARLO, 2000). This "Because being skilled does not assure one is disposed to use CT. And, being disposed toward CT does not assure that one is skilled." (FACIONE *et al.*, 2000, p. 35; CT stands here for "critical thinking"). Therefore, if we want people to be disposed and able to engage in critical thinking, the ideal education "combines developing critical thinking skills with nurturing those dispositions which consistently yield useful insights and which are the basis of a rational and democratic society" (FACIONE, 1990, p. 3).

In more psychological terms (cf. PEREIRA; ALICH, 2015), critical thinking can be conceptualized as reasoning of higher complexity, which articulates knowledge, experiences, and intellectual skills, presenting itself as a reflective activity involving cognitive and affective aspects. In cognitive terms, critical thinking implies logical reasoning as well as executive functions, which include complex goal-oriented behaviors such as decision making, planning and executing plans, and mental flexibility. Emotions are also fundamental (cf. BROOKFIELD, 1987) because, when trying to think critically, it is impossible not to become aware of the importance of one's own emotions (and subsequent reactions) for this activity.

6. OUR PROJECT: A TRAINING THAT ENCOURAGES STUDENT'S CRITICALITY

Literacy proficiency and critical thinking are important factors for participation in social and political life and therefore for democracy (MORAIS, 2012, 2018). With critical and argumentative reading and writing, the reader-writer can analyze information critically,

and to make its critical analysis and evaluation known in a rational and solidly argued manner. Therefore, it is literacy that allows free thinking and thus helps to foster democracy. Literacy should be encouraged through appropriate training, particularly in the context of socio-political action and thinking. This view agrees with the notion held by Paulo Freire that the role of education is a "practice of freedom", a "political act" that liberates individuals through critical, transformative, and differential consciousness (FREIRE, 1967/2012; 1968/2015, translations are ours). This has important implications: "if education alone does not transform society, without its society does not change" (FREIRE, 2000, p. 67, translation is ours).

Our project is therefore to examine and foster critical thinking in various kinds of severely disadvantaged people, in particular subliterate adolescents (≃ 15 years old) and adults who attend, respectively, vocational education and adult basic education classes. More specifically, we want to check (i) whether we can train them on critical thinking; (ii) whether this training is more effective if it is based on written rather than oral/audiovisual material (including training associated with these materials), and (iii) what are the relationships between critical thinking and literacy as well as other cognitive skills: language skills, memory skills, reasoning, executive functions, mind theory.

Because of the lockdown (compulsory confinement or isolation due to the COVID-19 pandemic), it has not yet been possible to apply the planned training, but we already have pre-test data that deserve discussion. They were obtained from 35 adult basic education (ABE) students in the French-speaking part of Belgium, mostly women (≃70%), with an average age of 34 (from 19 to 55), native French speakers (≃ 70%; most non-French speakers had lived in Belgium for over 15 years[6]), and largely unemployed (> 85%) after having completed vocational studies (≃ 60%) and some (17%) only primary education.

In this article, we comment only on the results obtained in the tests of reading, writing and associated metaphonological abilities, of critical and associated thinking, of logical reasoning, and of affective Theory of Mind.

In terms of **reading, writing and metaphonological skills**, several studies had already indicated that ABE students perform less well in reading and spelling pseudo-words (pronounceable but meaningless sequences) than primary school children matched on reading regular high frequency words, and that they are very poor in phonological segmentation tasks, especially phoneme segmentation (*e.g.*, in French: DELAHAIE *et al.*, 2000; EME; LAMBER; ALAMARGOT, 2014; in English: GREENBERG; EHRI; PERIN *et al.*, 1997; THOMPKINS BINDER, 2003). ABE students achieved a performance similar to the one of fourth grade children, although they read more rapidly and were better at irregular word

6 Two additional subjects, of recent emigration and with very poor oral understanding of French, had been discarded from the initial sample of 37 people.

reading (cf. the norms of MOUSTY; LEYBAERT, 1999, and WESSANG; GARIEL, 2008, for the French-language tests developed by MOUSTY *et al.*, 1994). Yet they were weaker in metaphonology (phoneme deletion; *e.g.*, [ʃɔ̃k] → [ɔ̃k]) and phonological memory tests (immediate repetition of pseudo-words) and presented poor "basic" (literal) comprehension in reading short texts.

The **media literacy skills** test (Print Measure subtest, ARKE; PRIMACK, 2009) evaluates the level of analysis, understanding and reflection through written support. It consists of reading a written text, presented as coming from a website called newleashonlife.org/animal, and which refers to a program of reintegration of prison inmates through dog training, precisely titled "New Leash On Life". The text explains that the program has existed for four years, its purpose, etc. After reading, there are several written questions aimed at evaluating memory of the story (*e.g.*, "The program has been in existence for ... years: 7/9/8/4"), understanding (*e.g.*, "What is the purpose of the message? – check all that apply – To inform / To persuade / To entertain / self- expression / To teach / To make money"), analysis (*e.g.*, "Identify the sender of the message. Where did the information originate?" Explain in writing; "How does the sender attract and hold your attention? – check all that apply – the use of language / quotes / expert opinion / human interest / emotions / Other - explain in writing"), evaluation ("What information or points of view may be missing from this message? Explain in writing") and synthesis ("What does this information suggest about the relationship between prison inmates and the raising of dogs for use by those with sight impairments? Explain in writing"). Not surprisingly, the average performance of ABE students was below that observed in undergraduate students (ARKE; PRIMACK, 2009). The most interesting finding was that, unlike on all other reading-writing tests, the results obtained on the media literacy test evaluation items correlated significantly with critical thinking performance, as measured by the Cornell Critical Thinking Test (CCTT, ENNIS; MILLMAN; TOMKO, 2005).

The principle of CCTT is that **critical thinking** is reasonable and reflective thinking focused on deciding what to believe or do, and this decision should be made according to certain principles of thought (*e.g.*, ENNIS, 1962, 1980). CCTT assesses induction, deduction, credibility, identification of assumptions through a narrative text in which it is said that you, the reader, are part of an expedition to a newly discovered planet. To sum up the story: A first group of explorers landed there two years earlier, but without any news from them, your group was sent to find out what happened. You will read about everything your group has learned. Facts are presented, you must assume them to be true, and you must decide if each fact supports the proposed idea or not. For example, "you and the health officer are the first to arrive at the group of huts. You call out, but you get no answer. The health officer suggests, 'Maybe they are all dead?'. You try to find out if he is right. Listed below are some facts you learn. You must decide whether each fact supports the health officer's idea, or

suggests that the health officer's idea is mistaken —*or* neither. For example, (1) "you go into the first hut. Everything is covered by a thick layer of dust". (2) "Other members of your group discover the first group's rocket ship nearby." And so on, totaling 71 multiple choice items of increasing complexity.

The total score is the number of right answers minus half the number of errors. This correction, which takes the wrong answers into account, is consistent with the test instructions warning participants to avoid guessing. The mean CCTT score observed in ABE students corresponds approximately to the 75th percentile in American children from 4th through 6th grade (ENNIS *et al.*, 2005). A very similar average score was also observed in 5th, 6th, and 8th grade students, with low socioeconomic status, mostly Afro-Americans (BLANTON, 1987; LUMPKEN, 1990, both cited by ENNIS *et al.*, 2005). And, in addition to the correlation with the media literacy test evaluation items we have already commented on, there was a significant correlation between CCTT performance and the number of books read per year, as well as with various other measures of reading habits or attitude towards reading. In particular, there were significant positive correlations with the statements that "I really like to go to the bookshop or library", "Reading is one of my favorite hobbies", "Before I fall asleep I usually read a few pages" and a significant negative correlation with the statement that "I only read if I have to". Responses to the latter also correlated negatively to the media literacy test evaluation items.

The ability to evaluate online content is increasingly a prerequisite for informed democratic participation and is thus part of so-called "civic skills". In the Homepage Analysis subtest of the **Civic Online Reasoning** test (adapted to French and to the Belgian context from MCGREW *et al.*, 2018), it is necessary to determine who is behind the information and evaluate the possible motivations of this source. Specifically, the participant must decide whether the items on the home page of an online news magazine are advertisements and explain why. The score varies depending on whether the participant can give the right answer and explain the reason. The most interesting aspect of ABE students' results from our study was the great variability in performance between items. They achieved very good results for the two items that they unequivocally evoked, either an advertisement or non-advertising content, but very poor results for the ambiguous item. This, although it was presented as an informative ad ("More men or women study exact sciences?"), also included the information "sponsored content" below. The ABE students themselves admitted that they did not know what this expression meant. There were significant correlations between the average score on this Homepage analysis test and performance in reading words, both regular and irregular.

Two other tests were questionnaires aimed at assessing attitudes. The **endorsement of conspiracy theories** was evaluated through the adaptation to French by Lantian *et al.* (2016) of the Generic Conspiracist Beliefs Scale (BROTHERTON; FRENCH; PICKERING,

2013), which assesses belief in conspiracy theories in five areas: government malfeasance, extraterrestrial cover-up, malevolent global conspiracy, personal well-being, and control of information. For each area a series of statements are presented (*e.g.*, "Secret organizations communicate with extraterrestrials but keep this fact from the public"; "A small, secret group of people is responsible for making all major world decisions, such as going to war"), which the participant must evaluate on a scale from 1 (definitely not true) to 5 (definitely true). A conspiracy average of 2 to 3 is considered modest. Consistently, values of about 2,5 were observed in a group of 147 adults with university education who were tested with the same francophone material as the one we used (CAMPION, 2020). However, among the ABE students we examined, the average was higher than 3, although there was no significant correlation with literacy or media literacy scores.

The "F Scale" is a test that was created by Adorno *et al.* (1950). The "F" refers to Fascism because the objective of the test is to **evaluate the authoritarian personality** of the individual. To this end, the F Scale considers several components of authoritarianism, such as conformism (rigid adherence to conventional middle class values), authoritarian submission (uncritical submission to the idealized moral authorities of the "in-group"), authoritarian aggression (tendency to condemn, reject, and punish people who violate conventional values), anti-intraception (opposition to subjectivity, imagination, and tenderness), as well as superstition and stereotyping (belief in mystical determinants of individual destiny; willingness to think in rigid categories), power and "toughness" (strong concern with dominance-submission, leader-submission dimension; identification with power figures; accentuation of ego attributes; exaggerated affirmation of strength and power; exaggerated harshness), destructiveness and cynicism (general hostility, degradation of the human being), and projection of impulses and exaggerated concern with sex[7]. Examples of statements presented on F Scale are "obedience and respect for authority are the most important virtues children should learn"; "Homosexuals are hardly better than criminals and ought to be severely punished"; "The world can be divided into two distinct classes: the weak and the strong". The participant evaluates each statement on a scale from 1 ("Disagree strongly") to 5 ("Agree strongly"). Although ABE students' scores were within the norms, there was a significant negative correlation between the F scale score and the media literacy test score: the higher the latter, the lower the tendency to have an authoritarian personality.

Besides evaluating critical thinking and attitudes, it is also important to examine **deductive reasoning**, because drawing inferences and conclusions is best done by using reason. The ability to reason involves consciously making sense of things, establishing and verifying facts, and applying logic to reach conclusions. We used a

7 Note that any resemblance to one or several Brazilian political figures is obviously not the result of chance.

syllogism test to examine the relative weighting in reasoning of logic (through the validity effect) and belief (through the belief effect). In fact, when presented with deductive arguments to evaluate, people should accept valid conclusions more than invalid ones (validity effect), but often tend to endorse arguments in whose conclusions they believe, and reject arguments in whose conclusions they do not believe, regardless of their actual validity (belief effect; *e.g.*, EVANS; BARSTON; POLLARD, 1983; KAUFMAN; GOLDSTEIN, 1967). We present here two examples of our material (for illustration, the premises and conclusions are presented in uppercase). An example of a valid but unbelievable trial is as follows: "Dogs are used extensively for numerous purposes and can be easily trained. NO AGGRESSIVE DOG IS A WELL-TRAINED DOG. The police also uses dogs a lot, and SOME AGGRESSIVE DOGS ARE POLICE DOGS. Assuming this passage is true, does it follow that SOME POLICE DOGS ARE NOT WELL-TRAINED DOGS?" An example of an invalid but highly believable trial is as follows: "Dogs are used extensively for numerous purposes and can be easily trained. NO AGGRESSIVE DOG IS A WELL-TRAINED DOG. The police also uses dogs a lot, and SOME AGGRESSIVE DOGS ARE POLICE DOGS. Assuming this passage is true, does it follow that SOME WELL-TRAINED DOGS ARE NOT POLICE DOGS?" There were also highly credible valid trials and invalid and little credible trials. The ABE students displayed a small but significant validity effect (hence, an effect of logic) and a much stronger belief effect. More interestingly, significant positive correlations were observed between the validity effect and critical thinking (CCTT scores), as well as with reading words and pseudowords, but a significant negative correlation was observed between the belief effect and literacy. Thus, literacy seems to help reasoning in two ways: both directly, by improving logical thinking, and indirectly, by reducing belief bias.

Finally, we also found it relevant to examine capacities related to **Theory of Mind** (ToM). This refers to the ability to assign mental states such as beliefs, desires, emotions and intentions to oneself and others to explain and predict behavior. It is important to investigate this type of ability because understanding literary texts requires taking into account the perspective of others and, more generally, their emotions, which, through processes of identification and mental simulation, are not only those of literary characters but become our own. Therefore, it is not surprising that there are retroactive effects of reading activity on ToM skills: several studies have shown that reading literary texts have a positive effect on the emotions, empathy and understanding of others' minds. These studies used, among others, the "Reading the mind in the eyes test" (RMET, BARON-COHEN *et al.*, 1997), in which the participant must choose the state of mind he or she considers best to describe what a person is thinking or feeling, based on a photograph in which only that person's eyes are seen. It has already been shown that the more people read narrative fiction in everyday life, the better their empathy and understanding of others is (*e.g.*, DJIKIC;

OATLEY MOLDOVEANU, 2013; MAR *et al.,* 2006). There is also a short-term priming effect: performance on ToM tests is better after literary reading than after non-fiction reading or no reading, and even than after popular fiction reading, which presents more predictable and stereotyped characters (*e.g.*, KIDD; CASTANO, 2013, 2019). These effects have consequences for society: to the extent that reading improves the ability to take on the perspective of others, it also improves attitudes towards other groups, thanks to a reduction in prejudice, an effect that has been pointed out as the "greatest magic of Harry Potter" (VEZZALI *et al.*, 2015). In fact, reading this best-seller improves attitudes towards stigmatized groups such as refugees, people with disabilities, etc. In the ABE students of our study, there were significant correlations between the RMET scores and the reading and writing scores, as well as with the media literacy test comprehension items and with critical thinking (CCTT scores).

7. CONCLUSION

The results summarized briefly in this article are obviously only preliminary, because the number of participants in our study is still limited, and, above all, because we have not yet been able to examine the effects of the training. Therefore, it remains to be determined what is the cause and what is the effect. However, the data summarized here already suggest the possibility of a two-way relationship between literacy and critical thinking. They also point to the importance of assessing media literacy and not only the basic reading-writing processes and confirm the relevance of considering the socio-affective aspects of ToM, as those considered in the RMET.

Although we do not yet have data related to the effects of training, we have taken advantage of the 2020 period of compulsory confinement to systematically examine the literature in this regard. And the conclusion is clear: there are almost no scientific studies that address this issue in severely disadvantaged people, as ABE students almost always are.

However, in Morais and Kolinsky (2020), we have already discussed a related issue, namely whether it is possible to teach critical literacy and argumentation to everyone. And our response was positive. For example, this was evidenced in an American educational survey of juvenile detention center residents, youths between the ages of 12 and 18, mostly African-Americans or Hispanics, whose average reading and math skills corresponded to fourth grade, whereas, if everything had gone smoothly, they should be approaching the end of high school (De FUCCIO *et al.*, 2009). The intervention designed by the second author, the famous educational psychologist Deanna Kuhn, intended to develop argumentative skills through dialogic argumentation with a colleague in the context of small groups. Compared to control participants, those who received the intervention dialogued with each

other much more (almost twice as long), demanded much less clarification, presented much more counterarguments to the opponent, made more refutations, and produced more distinct reasons per dialogue. The authors emphasized the role of representing the thoughts of others and articulating one's own thoughts and reasons. Argumentation and practice of counter-argumentation also helped to understand the difference between criticizing an idea and criticizing the person who emits it.

Although critical literacy is not completely equivalent to critical thinking, they are associated concepts (see discussion in MORAIS; KOLINSKY, 2020). Therefore, there is no reason a priori not to offer the poor an education in critical thinking that has the same quality as that reserved for the upper-class, since even in the latter, many people do not even present dispositions for critical thinking, perhaps partly because critical thinking could threaten their system of privileges and meritocracy.

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