

REVIEW

# What can literacy and cognitive abilities of the brain tell us about critical thinking?

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## ABSTRACT

Mrs. Kolinsky traces a trajectory from the concept of literacy of the 19th century, going through evidence of changes in literacy in the cognitive capacities of literate subjects, until the data description from pretest sessions of her research with adults at EJA (Youth and Adult Education) in Belgium. Professor contributes with important thoughts on the acquisition of reading/writing and cognitive correlates and its impact on society. The researcher brings evidence of the relationship between literacy and critical thinking and the distortion of information. She highlights literacy to the formation of critical thinking by citizens, whose role is crucial to the democratic dynamics of a country. In Brazil, low literacy stands out negatively in the reading rates of young people assessed by Pisa, classifying more than 70% of them as bad readers, turning into a serious and alarming situation in the country.

## RESUMO

Régine Kolinsky traça uma trajetória do conceito de "literacy" do século XIX, passando por evidências de mudanças da literacia nas capacidades cognitivas dos sujeitos letrados, até a descrição dos dados do pré-teste de seu projeto com adultos na EJA (Educação de Jovens e Adultos) na Bélgica. A professora contribui com reflexões importantes acerca da aquisição de leitura/escrita e correlatos cognitivos e seu impacto na sociedade. A

professora cita evidências da relação entre literacia e o pensamento crítico e a desvirtualização da informação. Ela destaca a literacia para a formação do pensamento crítico dos cidadãos, cujo papel é fundamental para a dinâmica democrática de um país. No Brasil, a baixa literacia destaca-se negativamente nos índices de leitura de jovens avaliados pelo Pisa, classificando mais de 70% deles como maus leitores, tornando a situação grave e alarmante no país.

### KEYWORDS

Literacy. Critical thinking. Distortion of information.

### PALAVRAS-CHAVE

Literacia. Pensamento crítico. Desvirtualização da informação.

Professor Régine Kolinsky's lecture occurred on May 12, 2020, in the series of online conferences organized by the Brazilian Linguistics Association (ABRALIN) during the coronavirus pandemic (COVID-19). The professor holds a PhD in Psychology from the Free University of Brussels (ULB) and is currently researching literacy and formal education and its impact on the human brain. Dr. Kolinsky is a professor and coordinator of the Cognitive Neuroscience Research Unit at the Free University of Brussels (ULB).

Professor Kolinsky's presentation begins with thoughts on the impact of literacy on perceptual and cognitive mental capacities. Accordingly, literacy<sup>1</sup> is the efficient and frequent use of reading and writing. The role of low literacy in critical thinking of undergraduates is the central theme of this lecture. The term used by INAF (Functional Literacy Indicator) is Functional illiterate, but Kolinsky uses the term sub-literate in order to emphasize the role of literacy, which has as its concept the frequent and efficient use of reading and writing, opposing to literacy, a term linked to *early literacy* (*alphabetization/alfabetização*), a process prior to the reach of literacy.

The teacher demonstrates her concern with reading levels in Brazil. PISA data (2018) indicated that the percentile of Brazilian adolescents who can achieve a more in-depth understanding of a text does not reach 2%. Although the outlook in OECD countries (Organization for Economic Co-operation and Development) is no longer encouraging, the rate of 73% of Brazilian adolescents that cluster

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<sup>1</sup> Kolinsky uses the term literacy and non-literacy for three reasons. The first is the international use of the term, used in English, French and Portugal, for example (literacy, in English). The second reason concerns the suffix "ento", observed by the author José Morais, which conveys the meaning of process, while literacy concerns the product, the final state of the process, the ability to read and write the person who has gone through literacy process, but today he is literate and has a literacy ability. The third reason is of historical importance since the term literacy has a more social use of reading and writing, and not personal. And the term literacy does not necessarily have a social meaning, although, according to Kolinsky's conference, it has consequences for the exercise of citizenship.

in the classification of bad readers<sup>2</sup> is striking. These statistics emphasize the urgency of the discussion about literacy in the country, since low literacy may be associated with higher levels of credulity in fake news, lying advertisements and conspiracy theories, with significant repercussions on democracy.

One of the factors that impact democracy, listed by the teacher, is the distortion of information, impairing the critical thinking of citizens. This critical thinking is a set of cognitive skills, composed by inferences and generalizations, attitudes of questioning and is, above all, the key element for the full functionality of the citizen in society. By efficiently and frequently using reading and writing for the acquisition, transmission, and production of knowledge, he sustains an intellectual self-defense (epistemic surveillance), which prevents him from being satisfied with only a superficial understanding of a text. The sub-literate presents difficulties to understand beyond the literal meaning of a text, to process unexpected ideas or to make the information concrete, leading these citizens at the margin of discussion about the fake news, lying advertisements and conspiracy theories circulating on the Internet.

An illustration of the impact of critical thinking is in the research with young Finns, brought by the teacher (AARNIO; LINDEMAN, 2005). The study compares young people from technical courses to university students and concludes that young people with less educational level are more susceptible to believe in paranormal phenomena, showing little criticism may be associated to lower education.

Several factors indicate low literacy skills impact critical thinking, considering that educational level and literacy are probably positively associated. They are: 1) People with a higher educational level read more and have more access to information; 2) People with a higher educational level are also more likely to use analytical reasoning processes and are less likely to enjoy simple and intuitive solutions to understand and solve complex problems; 3) People with a higher educational level are less likely to attribute intentionality and action to inanimate objects and, finally, 4) They are more motivated to form beliefs based on logic and evidence. For this reason, individuals who read in less quantity and quality may be confused with the distortion of information and choose a path of understanding in which there is less chance for critical evaluation of a text.

There is an impact of literacy on perceptual and cognitive mental abilities. An example brought by Professor Kolinsky is the auditory verbal memory, which is lower in illiterate<sup>3</sup> adults compared to literate adults. Illiterates take longer in tasks of immediate repetition of pseudowords or immediate serial recall of word lists (CASTRO-CALDAS et al., 1998; MORAIS et al., 1979; REIS; CASTRO-CALDAS,

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2 73% of Brazilian adolescents, students in the 7th year of elementary school, are below reading level 3 of PISA (International Student Assessment Program). Thus, most 7th grade teenagers in Brazil are only able to answer basic reading items, such as direct information, and make easy inferences (corresponding skills up to PISA level 2 reading).

3 Those who, for social reasons, never went to school, are unable to identify any type of written material (except their name), do not have a profession that requires familiarity with written materials, and do not have parents were considered uneducated in these studies. literate (REIS; CASTRO-CALDAS, 1997).

1997). This occurs, according to the teacher, because in the literate, the auditory verbal memory benefits from the support of the mental representations of the spelling of words and the metaphonological representations learned from literacy. These results were replicated in the current study by Kolinsky (not published). The professor points out that her data is still preliminary. Pre-test data from the current research of her neuroscience laboratory carried out with adults from EJA in the French-speaking part of Brussels, a less favored region, shows that undergraduates underperformed second-grade literate children in tasks of awareness and phonological memory. The tasks consisted of repetition of pseudowords and suppression of phonemes.

Those who learn the alphabet and use it build new strategies to deal with the oral language: conscious phonological processing, visual representation of the word shape, and all the associations that these strategies allow (such as lexical access and also semantic processing, for example). Illiterates, on the other hand, do not develop these strategies and depend more on the semantic processing of language, probably because of this, illiterates transform pseudowords into real words in the lexicon of the language, giving meaning to them, as in the seminal study of Castro-Caldas et al. (1998).

Scientific data shows our brain goes through a process of neuronal adaptation to reading. Learning to read changes the apprentice's neural networks (DEHAENE, 2012). Thus, the mental linguistic capacities related to literacy developed by literate subjects mentioned by Dr. Kolinsky - verbal memory, phonological awareness/metaphonology, orthographic mental representation of words - show consequences on the neural networks of the brain of the one who learns to read (DEHAENE; COHEN; MORAIS; KOLINSKY, 2015).

Another example brought by Kolinsky about the impact of literacy in mental cognitive abilities is in the use of syntax. Literates and illiterates also use different syntactic structures. The oral language and the written language are different. The oral language is more adjective, and the written language has more processes of subordination and connective structures. The teacher mentions the study by Shallice and Willis (apud KOLINSKY, 2020) which shows that illiterates have greater difficulty in understanding spoken sentences. Approximately one third of the illiterates base their understanding on the order and contiguity of the salient terms, presenting difficulties in resolving ambiguities, for example. The lack of repertoire is evident in this situation. Learning to read increases and diversifies the individual's knowledge database, being an important source of vocabulary enrichment, especially of encyclopedic or academic knowledge terms. According to Lieury and Lorant (2013), between 6th and 9th grades, vocabulary acquisition varies with the addition of almost fifteen thousand words.

Kolinsky brings in the explanation of the preliminary data of the pre-tests applied in the current research of her laboratory, the correlation between linguistic skills such as phonological awareness and understanding of what is read and the capacity for critical thinking. Critical thinking was measured by the CCT test (Cornell Critical Thinking Test), which is a 71-item test that assesses the induction and deduction of information and the credibility of identifying assumptions through a narrative text. The score of adult SJA subtext tested by Kolinsky and partners was low. There was a correlation between the critical thinking test and measures of investigated reading habits, such as the number of books

read per year by the participant. Thus, with these and other preliminary data brought to the conference, Professor Kolinsky seeks to make clear the relationship between literacy and critical thinking.

The lecture showed the privilege of literacy is characterized as a means of transforming critical consciousness and, above all, it is a practice of freedom (FREIRE, 1968/74). Literacy is not a necessary factor for democracy, but generalization provides conditions to debate and contribute to everyone's decision (MORAIS, 2013, p.21). As Morais says about democracy, "it is *debate and decision: debate open to all and decision taken collectively by the majority*" (p. 21) and that, at the moment when the openings for debate close, freedom of choice and perspective for the future ceases. Reading and understanding the information given is citizenship; it allows to place oneself as a political being, endowed with opinion and free of ties, which are the pitfalls of distortion of information (as fake news, for example). Critical thinking, due to the increase in literacy, breaks down barriers.

An illustration, with which we finish our review, is the "great magic of the Harry Potter saga", mentioned by Kolinsky. The popularization of the reading of J. K. Rowling's books allowed attitudes towards stigmatized groups to be transformed, exempting them from prejudice. This is exactly what we want for Brazil, a country with low reading rates, which can be changed with seriousness, political will towards investments in education.

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