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LITERACY: AN INTERVIEW WITH RÉGINE KOLINSKY

Régine Kolinsky¹

REVEL – What is dyslexia and what kind of research has been developed on it, both in Linguistics and Neuroscience?

KOLINSKY – The kind of dyslexia people commonly talk about, considering it is the one that worries students’ families the most, is called development dyslexia. It is a specific learning disorder concerning the reading, many times associated with weak writing ability. A child is considered dyslexic when their reading level shows a delay of at least 18 months in relation to the level expected regarding their schooling, discarding cases where the delay can be explained by an intellectual or sensorial deficit and by inadequate instruction or lack of stimulus in their environment. This method of defining dyslexia by exclusion (which is also adopted by international classification systems, such as the International Classification of Diseases – ICD – or the Diagnostic and Statistical Manual of Mental Disorders – DSM) is revealing in terms of how researchers are still in the process of understanding both etiological factors (e.g. genetic risk) and causes related to the disorder, i.e. brain functional and anatomic development anomalies, and correspondent cognitive processes disorders.

Nowadays, most researchers are in accordance regarding two findings. First, there is a genetic component in dyslexia, which is indicated by the risk of a child becoming dyslexic being much higher when a first-degree relative (parents or siblings) is dyslexic. Second, even though there may be multiple causes related to dyslexia, the most frequent seems to be a speech disorder. In fact, it seems that most dyslexics present a specific deficit for representation and/or retrieval of speech “sounds”, which are called *phonemes* (further I will explain them). This deficit disrupts the establishment of

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correspondence between these speech “sounds” and the visual signs that represent them, in other words, in an alphabet, the letters or groups of letters (like “th”), called *graphemes*. It consequently disrupts the learning of the reading ability. We are, therefore, very far from the historical hypothesis that attributed the origin of dyslexia solely to a visual deficit, a “congenital verbal blindness” – the name assigned in 1896 to the first case of development dyslexia –, which in no way excludes a subgroup of dyslexic people of effectively presenting certain disruptions of visual attention.

Identifying more precisely the characteristic disorders of dyslexia is still a challenge. One of the greatest difficulties of this research consists on being able to prove that an anomaly found in dyslexic children is truly in the origin of their disorder. Almost every year a scientific article claims to have identified a related cause to dyslexia. However, most part of the anomalies identified is, in reality, consequence of the weak level of dyslexic children in reading. I, myself, have participated in several research studies that tried to identify this eventuality, examining adults that remained illiterate strictly for socioeconomic reasons, i.e. because, in their childhood, they had not attended school, or had attended seldom and poorly, due to their family’s poverty. When it is observed that, in illiterate adults compared to literate ones, a brain structure is less activated, the same way of dyslexic children compared to normal reading children, it becomes evident that it is not about a genetic anomaly or an anomaly of any other biological kind, but that the occasions of cognitive and linguistic learning and particularly of learning of the reading ability are the ones that modify our brain and our cognitive system. A person’s brain and cognitive system with a very weak or null reading level do not work in the same way as the ones of a literate person.

Another current matter also related to causes of difficulties of learning the reading ability and, specifically, of children who are truly dyslexic is to identify which methods are more effective to help children in one of these scenarios. The matter concerning dyslexic children is also very important because, even if in Brazil the cases of insufficient learning of the reading and writing for socioeconomic reasons and/or bad teaching affect more than half of the population, it is possible to infer, based on data from developed countries, that, between 3 and 5% of 10-year-old children present apparently specific and persistent difficulties in learning how to read (cf., in France, the collective assessment of INSERM, 2007) and that most of these children are truly

dyslexic. Nowadays, the proposals still go in many directions, from evident intervention like the training of speech analysis in phonemes to much more indirect interventions e.g. through music.

Anyway, all these studies show that isolation of scientific subjects can only be nefarious, since the collaboration among researchers that relate different subjects (namely, cognitive neurosciences, experimental cognitive psychology, linguistics and phonology) is most productive.

REVEL – What is the importance of reading for the social and brain development of children?

KOLINSKY – Nowadays, not knowing how to read sentences people almost always to social exclusion and poverty. This relation turns into a vicious circle, since the parents' illiteracy heavily influences the possibilities of children's learning (including the reading ability) and that happens from generation to generation. Illiteracy, as other poverty aspects, becomes, unfortunately, "hereditary".

Besides personal life cases, there is a great danger to the political level: many studies show a relation between the weak study levels and, therefore, the weak literacy level (i.e. reading and writing abilities) of people and their credulity. In a world of misinformation, fake news and mystical and conspiracy theories, that is obviously problematic. I fear Brazil is an unquestionable illustration of this, as the results of the PISA inquiry show, to which I shall return further in detail.

In regards to brain development, although it is difficult to dissociate the effects of reading acquisition from more general effects related to schooling or simply the fact of benefiting from better socioeconomic conditions during childhood, it has been clearly shown that learning how to read almost completely reorganizes the brain, both in anatomic and in functional levels. And, in general, it is observed a strengthening of brain structures and responses due to literacy acquisition. Learning how to read and write requires a high level of both visual precision (to distinguish letters "c" and "o", for example) and of hearing precision (more precisely phonological precision: to distinguish, for example, "die" and "tie"), and a lot of flexibility (to recognize that

characters a, A, A, a, a e A all represent the same letter), and all of that constitutes experiences of beneficial training for the brain.

Besides, I would like to recall a trivial fact, but exactly because it is trivial it is easily forgotten, which is the fact that it is through reading that we acquire a great part of our vocabulary and, in general, of our knowledge. Just to give an example, very simple, I was part of those who showed that the number of animal names that, for example, a person can produce in one minute depends on their schooling and literacy levels. An adult person that remained illiterate is rarely going to produce “rhino” or “platypus”. This is due to these names being “encyclopedic”, i.e. usually learned in school, as well as the words “Uranus” and “vector”. And the amount of “encyclopedic” words we learn in school is enormous. An inventory of these words in school manuals showed that students from schools in France are exposed to an average of 6000 encyclopedic words in 6th grade and 24000 in 9th grade. The acquisition rate of these terms doubles each year in the school period: 2500 new words by the end of 6th grade and 17000 by the end of 9th grade. Illiterate adults will probably not recognize any of these words and will never get to know them: does anybody usually hear about Uranus or a platypus in a supermarket, in the bus, in the subway, or in their work place (except, obviously, for schools and universities)?

Anyway, it is also important not to forget that the reading of literary texts allows us access to other people’s mental worlds. In fact, several studies showed that reading literary texts reinforces empathy and comprehension towards other people, as well as the ability of taking their point of view into consideration. Thus, reading of literary texts can also contribute to improve our attitudes towards stigmatized people (refugees, disabled people, etc.) because it helps to reduce our prejudice. To achieve this kind of effect, it is necessary, evidently, for texts to have a minimum of literary quality. If the texts present caricatured characters, with too obvious personality and intentions and, therefore, predictable and coherent behavior, their reading is worthless. But also we should not believe that it is absolutely necessary to read Tolstoy: a study showed that this kind of effect is thanks to the reading of Harry Potter, commenting, by the way, that this was the greatest magic of this best-seller!

In more general terms, it is possible to consider, as my colleague José Morais did, in his book *Alfabetizar para a democracia*, published in its Brazilian version by the Publishing House Penso/Grupo A, from Porto Alegre, that literacy has a dynamic interaction with democracy. This process may be positive or negative: it is negative when literacy, unequally shared, is reduced simply to abilities (even when these are extremely sophisticated), instead of being, above all, a way of free, critical, argumentative thinking, inspired by humanist values. This idea seems to me particularly important in the scenario of our pseudo-democracies, when supposedly free elections substitute a well-informed public debate...

REVEL – How can studies in Neuroscience be helpful for teachers that work with literacy?

KOLINSKY – The knowledge gathered since around 40 years ago in studies of cognitive psychology, psycholinguistics and cognitive neurosciences may help teachers in at least two ways: they show which the greatest mistakes that should be avoided in teaching of reading are and suggest procedures that allow the teachers to optimize the teaching of reading.

For example, in what concerns the debate that opposes the approach we call “phonic”, which calls the attention of students to associations between graphemes and phonemes, to the approach called “global”, which insists in the memorization of full words, the studies’ results are clear. They show that the global method not only is less effective than the phonic method as it also mobilizes an inappropriate brain circuit, since it is located in the right hemisphere, when we already know that the brain network that sustains fluent reading is located in the left hemisphere. And also, it has been shown that the inefficiency of the global method affects in a more negative way the learning of the reading ability the smaller the family’s cultural baggage is, measured by the schooling level of students’ parents. Thus, a French study examined reading of words, reading comprehension, orthography and written production of 446 students in the end of 1st year of primary school, who attended schools in popular neighborhoods of the Parisian region where school failure is particularly usual.

In the case of children whose parents could not successfully finish their secondary schooling, the global method led to 36,4% of average approval, against 62,6% for the phonic method. For those whose parents achieved, at least one of them, a diploma of secondary school or higher, the rates were 56,1% and 68,6%, respectively. The difference between these two groups, about 20% with the global method, reduced, therefore, to 6% with the phonic method. And it is very important to emphasize that, in both cases, the phonic method led to better results. In relation to the global method, the difference in favor of the phonic method was around 26% when the parents' schooling level was low, and even when the schooling level was higher, the difference reached 12%. In other words, the phonic method is the most effective and makes all students progress, no matter the parents' diploma level, and in the global method, being the worst for all students, it is a calamity for those whose parents have a low schooling level. The more effective the method – and, I repeat, in all cases, it is the phonic – less sensitive are the students' performance to cultural inequality. These results are very clear in terms of teaching resources teachers can rely on in their fight against scholar failure, at least in literacy, and even against the impact of social inequalities in school achievement. And they are very clear in terms of what method to adopt, as long as it is well understood and well applied.

Studies also allow us to understand what the main difficulties in learning the reading ability are. Besides comprehension of the “alphabetic principle”, which I will refer to in a moment, learning how to read requires the student to master the orthographic code of a specific language, i.e. the relations between graphemes and phonemes. This code may vary from one language to another, due to its complexity, and differently according to reading or writing. For example, in Portuguese the letter “f” is always read [f], and [f] is always written “f”. However, letter “s” may be read in more than two ways, [s] in “saca”, [z] in “casa” and again [s] if it is repeated (“cassa”), but [s] can also be written “ç” (in “çaça”). Knowing the complexity degree of Portuguese orthographic code, both in reading and in writing, we can fixate an ideal order to the teaching of words that starts with the simplest relations (biunivocal) between graphemes and phonemes and move on to those that present more variation. Thus, nowadays we can know what is best to insist on in different stages of the process and fixate an ideal order, for example, introducing the teaching, and therefore the learning by the student, of how to read words which contain the letter “f” long before we advance to the reading

of words that contain letters like “s” and digraphs like “ch” and “an”, which correspond to one phoneme. This is exactly what we have been doing in my team, especially in the scenario of an adults’ literacy study, who are native speakers of European Portuguese and completely illiterate. Thanks to this program, we managed, in three months, to have them learn how to read, decoding, and even how to write (but with not so great results), both words seen in class as words they had never seen before and even pseudo-words, i.e. words that do not exist in Portuguese, but which are consistent with the rules from the orthographic code. We intend to do the same in Brazil with a much larger number of students, and for a longer period so we manage to have them automatize at least the reading process of words already seen several times. If I have the opportunity, I will talk later about the importance of surpassing the decoding and reaching an automatized way of reading words.

REVEL – Yes, how important is phonological awareness in the process of learning to read and write a language?

KOLINSKY – Phonological awareness, and, more specifically, how we become aware of phonemes, constitutes the first critical step of learning how to read in an alphabetic system. To use an alphabet, it is in fact crucial to understand the “alphabetic principle” according to which the letters or groups of letters represent phonemes. Well, phonemes are relatively abstract units that not always have an evident relation with the speech ‘sounds’ (it is on purpose that I put these words in between reversed commas). An illiterate person, be them an adult or a child, is not aware that there is, for example, two ‘small sounds’ in the word “dá” (/da/). And it is difficult to explain the existence of these ‘small sounds’, because we cannot pronounce many of them in isolation. Try pronouncing a “d”: there will always be another sound after; and if one pronounces /do/, /du/ and /di/, the shape of one’s mouth will be very different from the moment in which one starts talking (watch yourself in a mirror when you try to pronounce these syllables!). In reality, it was, indeed, the invention of alphabetic writing (an unconscious invention of what we call the “alphabetic principle”) that forced us to understand that, after all, there is something in common among /do/, /du/ and /di/. We, literate people, hear the same small initial sound, but, in reality, this small sound does not exist. It is only an articulatory modulation, common to the production of the vowel when begun by /d/, and the same happens, but with a different acoustic

configuration, when other consonants are pronounced before these vowels (for example, /bo/..., or /go/...). It is not easy to accept by just watching the mouth! That is why the explanation of this phenomenon, which results in speech properties, was only found around the middle of the twentieth century. You see, so many generations have used the alphabet without knowing what the letters in the alphabet represent! Because they represent phonemes, and these are not even tangible units, they are dynamic articulatory relations evidenced by speech perception scientists, and these would not have found them if the scientists themselves had not been literate.

Now, becoming aware of phonemes (not in a scientific way, but in the way of when we are literate and discover that each letter may in fact represent any recurrent thing in a syllable) only constitutes the first step of learning the alphabetic writing. Although it is crucial, to reduce the learning of how to read to this first step would be as absurd as to believe that one knows how to swim just because they were able to float in water without sinking. As I previously said, to master the orthographic code is also indispensable. And it is necessary to automatize the recognition of written words, which is achieved by relatively intense practice of reading and writing, especially during a comprehension reading and an intentional text creation.

That is because to stick to decoding (as we were forced to do in our study in Portugal due to a budget situation) is to risk educating functional illiterate people, i.e. people whose difficulties in reading are so great they have run out of mental resources (particularly, attention, memory and cognitive control to understand and write texts, even small ones). This is what happens to most of Brazilian young readers, as was presented in the disastrous data by PISA, the inquiry that evaluates the reading comprehension of 15-year-old teenagers attending school in countries from OECD and some more. PISA distinguishes 7 levels of ability: level 2 is considered a level of basic competence, from which students begin to demonstrate their reading competences. The ones who do not reach level 2 have difficulties to understand texts, which is equivalent to a life sentence as functional illiterate. According to the PISA inquiry from 2015 (and published in 2016), these bad readers are 20% of the average in countries from OECD (which is already a lot) and 52% in Brazil!

Scientific studies show that skilled readers, those who can read and understand a rather long text, in reality, just seldom use sequential decoding, letter-by-letter, or even syllable-by-syllable. It only happens when eventually they find a new word, the so-called encyclopedic ones, and when the term is complex and not familiar like for certain chemical compounds (for example, if they are confronted with “fluoroantimonic acid”). Except for these cases, the fact of having already read a lot has led the skilled readers to constitute mental representations of the orthography of a large number of words. One or two brief looks (“fixations”) are enough to activate these representations (this is obviously a simplification, since researchers have shown that these looks “hide” in reality very fast, but above all very complex, perceptive processes). What matters is that for the cognitive system, this processing is much less costly and leaves, therefore, for the reader, enough mental resources so that they can understand the meaning of a relatively long text and relate it to their knowledge, in a way they can come up with hypotheses regarding the purpose of the text and evaluate it in a critical way. It is this kind of ability that allows the reader to reach level 4, as defined by OECD. But this level 4 was only achieved by 29,5% of teenagers in the average of countries from OECD, and by only 9% of Brazilian teenagers (to compare with another country from Latin America, this proportion is 30% in Chile). Therefore, only very few young people are able to reflect critically about written information.

REVEL – You have worked as a visiting professor in both Japan and Brazil. How was your experience in these two very different countries?

KOLINSKY – I enjoyed both experiences, but for different reasons. In a professional level, it is obvious that the work is facilitated by the fact that Japanese people have, in general, extraordinary instruction level and professional conscience. The collective well-being overlaps other considerations most of the times, and for this reason, Japanese people are very respectful towards each other, for example, in terms of noise and hygiene, which is very nice in everyday life. The safety feeling, by the way, is exceptional and, aside from some very well-known neighborhoods, most neighborhoods in big cities are entirely safe, both day and night. But every culture presents their own advantages and disadvantages. Thus, too much respect may lead to people’s isolation and make the social consensus overlap the rest, it may also damage self-affirmation, creativity and freedom of thinking, even in the scientific sphere, not

to mention the political one. As usually happens, the extremes unite, but through very different paths. In summary, Japan presents maybe too much uniformity. As for Brazil... it is the opposite, it is too diverse, and it goes to extremes, from great to terrible. I fear for Brazil and, at the same time, I trust many Brazilians who have a big heart, open mind and creative language.

REVEL – How important is it for a linguist to have a solid formation in Cognitive Sciences?

KOLINSKY – Linguists frequently develop very sophisticated hypotheses and theories, with a very interesting, almost mathematical, formulation. The analysis they do of language leads them to formulate fundamental concepts. But many times they do not worry about what matters to cognitive sciences, i.e. about likelihood of their theories in terms of psychological reality: is it really how this works in our heads? Their formation did not make them raise this question, and neither does it require them to submit their theories to strict experimental tests, which, in my knowledge, is the only way to scientifically verify the veracity of a theory, whatever the study domain is. This is what the phoneme example illustrates (which I have already talked about). Inversely, the cognitivists are at times very naïve in linguistics, ignoring the fundamental theoretical concepts for their own study field. And, therefore, I would say that we, the cognitivists, need linguistics as much as linguists need cognitive sciences.

REVEL – What is the future of literacy?

KOLINSKY – In my opinion, the future is rather dark. It has increasingly been spoken of literacy as reference to some content: financial literacy, political literacy, scientific literacy, etc. But forgetting the general state of world literacy level is not bright in any way, as the PISA questionnaire shows. And the situation is not any better in regards to adults, as shown by the results from the OECD *Skills Matter* questionnaire, which examines the competences of 25-to-65-year-old adults. According to both questionnaire programs, literate people, in the sense of intentionally practice high-level reading and writing competences, represent much less than half of the world population.

We risk, therefore, if we do not act on it, to be emerged in a system in two speeds, with only a small minority of people that are literate. Look at what is happening with the approach called “ICT4D” (*information and communication technologies for development*). It considers that the most important is not to teach how to read to the greatest number of people possible, but to conceive specific instruments that allow illiterate or very little literate people access after all to communication and information technologies. They propose, for example, to conceive audio and audiovisual interfaces, with no text, for cellphones. By the way, computers and the Internet provide more and more systems of vocal synthesis that “read” any text out loud. Up to this point, ok.

However, if we take into consideration, at the same time, the development of these technologies with a manifest lack of political willingness, in the whole world, of eradicating illiteracy, we may fear the future. Above all, the use of these new technologies, in place of correct policies of teaching the reading ability and of eradication of illiteracy, could strongly limit the autonomy of these people, including their access (not filtered) to historical sources, in a future world where their avatar would tell, for instance, the present. This would not constitute, evidently, a benefit for information freedom – nor, by the way, freedom of speech.

And, therefore, I will not resist the pleasure of referring to José Morais’s “dream”, just as described in the book *Alfabetizar para a democracia*, to which I have already referred.

The PRIME (Plan of Equal Redistribution of Educational Means)²:

I have dreamed!

That a government in Brazil – I do not know which government, nor which Brazil – created and applied the PRIME:

1. *All new-borns will be examined by a pediatrician and in this occasion they will receive books for the crib and for the bath, being later periodically visited for their health state control.*

² Plano de Redistribuição Igualitária de Meios Educativos.

2. *All families with children will receive, each, 500 children's books, juvenile books and adult books, of different genres and domains, and will be periodically visited by a specialist in reading and literacy.*
3. *All families will be able to choose the school in which they want their children to study, under the condition that every school respects a quota of registered students from different sociocultural classes, correspondent to their proportion in society.*
4. *All children will receive a computer and a digital reading device and will have access to a personalized "tutor" who may orient them in their readings and written productions.*
5. *All schools will afford their own library correctly prepared with books and study seats, with longer office hours and the service will be performed by an employee formed for the job, and they will be regularly visited by specialists in reading and literacy.*
6. *All schools will monthly publish a newspaper in which the best articles written by students and those in which the weakest students will have done notable progresses will appear.*
7. *All the newspapers (including the sporty ones), national and regional ones, radio stations and TV channels shall include in their daily schedule an educational show for children and other teenagers, prepared by a team of specialized journalists hired through an entrance exam by the Ministry of Education.*
8. *All museums, theaters, cinemas and all music rooms will reserve specific schedules to receive visits from school groups accompanied by specialists in arts formation and according to a national program determined by them.*
9. *All city, state and federal authorities in the education sector and, more specifically, in the literacy sector will annually do seminars with national and international specialists to update their knowledge based on most recent scientific evidence.*
10. *All children will know how to read and write autonomously by the end of the 1st year, in a correct and highly fluid way in the 4th year and will continue to read willingly to raise their knowledge, feel the beauty and the deep sense of literary texts, being able to have a critical spirit and creativity.*

If we are many to dream, maybe one day all of this will stop being a dream.