

Disability, Diversity and Inclusive Education in Haiti

Learning, Exclusion and Educational Relationships in the Context of Crises

Edited by Rochambeau Lainy

First published 2023

ISBN: 978-1-032-38946-2 (hbk)

ISBN: 978-1-032-38947-9 (pbk)

ISBN: 978-1-003-34764-4 (ebk)

Chapter 7

**Left-handedness attempts at
dyslateralization, duress, and
performance in reading and writing**

Rochambeau Lainy

(CC BY-NC-ND 4.0)

DOI: 10.4324/b23239-12

The funder for this chapter is USAID

7 Left-handedness attempts at dyslateralization, duress, and performance in reading and writing

Rochambeau Lainy

7.1 Introduction

Being left-handed or right-handed results from a phenomenon known as laterality. It is the functional predominance of one part of a symmetrical organ of the human body over the other part. Dictated by neuropsychology, laterality is more or less clearly established around four to six years old (Hebting, 2003; Bergeret & Clavel, 2006), but we accept a hypothesis that its first signs appear from the age of three to four months (Flament, 1963; Bertocini, Morais et al., 1989). The genetic, anatomical, embryological, even obstetrical causes of its establishment are not easy to prove (Valière-Montaud et al., 2003; Scohy, 2012), because whether it is from the right or from the left, it (the laterality) seems to result from a process that is gradually defined (Du Pasquier-Grall, 2001).

Since Broca's discovery (1861–1865), it has been accepted that laterality is linked to processes that lead to a prevalence of sensorimotor and cognitive functions (Sergent, 1999; Faure et al., 2008; Karolis et al., 2019; Neubauer et al., 2020). It is this phenomenon that we observe when a child naturally uses his right side (he is right-handed, right-footed, etc.) or his left (he is said to be left-handed, left-footed, etc.) to perform motor and/or sensory functions. Some subjects can skillfully and symmetrically use both sides of the body (they are ambidextrous), while others are very dominant on one side. Researchers accept the idea that there is a functional asymmetry in the exercise of these peer organs (Hécaen, 1973; Habib, 2009). However, due to neuropsychological pathologies or established socio-cultural preferences, the natural hemispherical dominance is not always allowed to prevail.

The asymmetry dictated by neurobiological predispositions is, in such cases and according to received ideas, responsible for functional and intellectual clumsiness (Morrell & Salamy, 1971). Thus, the easy and natural use of the right hand by a young child is symbolically perceived as an asset, while being left-handed is felt to be the result of a deficiency, an anatomical anomaly, or a kind of mental degeneration (Bertrand, 2001, 2011;

Renault, 2016); the left appears, according to tradition, to be negative, clumsy, and unproductive.

7.1.1 *Lateralization, laterality, and dyslateralization*¹

To speak of laterality as a neuropsychological phenomenon is to emphasize a process that research calls *lateralization*. Lateralization is this process that makes it possible to indicate the differences in the organization of functions between the cerebral hemispheres which are apparently symmetrical (Hugel, 2014). Each organ of the body is, under the control of cerebral hemispherical predispositions, specialized in the execution of a motor, sensory, or cognitive function. Authors recognize (Sergent, 1999; Karolis et al., 2019; Neubauer et al., 2020) that there is a functional predominance in the sense organs (eye, ear, hand, and nose).² If the preference for one part of the organ over the other is what is called laterality, lateralization is indeed the process. Fagard writes that “Laterality is indeed expressed in hand, eye, foot and auditory preferences, in differences in sensorimotor performance and in directional tendencies” (2016: 28). On this point, he agrees with authors who see the prevalence of one side over the other, during spontaneous or directed behavior (Rivière, 2000; Dailly & Moscato, 1984; Lauzon, 2001). Laterality facilitates the space of perception, promotes the integration of sequential, complex, and abstract processes. It reveals the predominant cerebral hemisphere, namely the side of the brain that performs a particular function (Fagard, 2012).

Laterality is, in this sense, a normal state in any human being that becomes apparent over time, but internal and/or external disorders can alter the regular functioning determined by the hemispheres. When someone is left-handed and right-footed, or left-footed and favors the right ear, or right-handed of the ear and right-handed of the eye, the laterality is said to be crossed. The predominance of the right or left eye, for example, does not necessarily imply that of the right or left hand or foot. Laterality does not always come from internal factors (biological and neuropsychological elements). External factors (social prejudices, received speeches, educational considerations, dyslateralization, etc.) sometimes overlie it. This is the case, for instance, of a left-hander who, maturing in an environment full of right-handed people, moves toward using his right hand.³ The case of Germaine, which will be recounted below, is one example among many, which shows that people are forced to use a side that has not come naturally, to perform sensorial, motor, and cognitive functions. They find themselves “dyslateralized.”

When use of the right side is imposed to the detriment of the left by society and education, in other words, oriented according to prejudices and negative discourse, the subject faces difficulties. His left laterality is thwarted by pressures of all kinds. Since dyslateralization is a process by which a subject is forced to have a lateral preference that has not come

naturally, Habib writes that “the anatomy of the brain, genetics, sex and sex hormones, as well as some environmental factors are likely to exert mechanical or cultural pressures on certain aspects of lateralization and the interaction between these different factors” (2009: 6).

Ultimately, when learning to read or write, laterality does not determine performance. Because, as Kerckhove writes: “all men, whatever their culture, are capable of learning to read and write; yet a large number of them remain illiterate and therefore fail to perform one of the specific functions of the left hemisphere” (1988: 6). This implies that the poor scores of pupils in reading and writing are neither a specific problem of natural learning capacity, nor a poor performance linked to lateral preference. The student who performs well in writing does not do so because he is right-handed or left-handed, but because he obtains the means and the environment that he needs.

7.1.2 Laterality, reading, and writing

Reading is a language activity implying *a priori* the decoding of grapheme-phoneme correspondences. This decoding requires recognition, analytical skills, and phonological memory (Brun-Henin et al., 2012). It includes the perception, co-construction and processing of written signs, part of a process of deconstruction-reconstruction and partial or complete understanding. During this process, signs and networks of signs representing written language are mobilized via a link between auditory and visual representation.

Writing, on the other hand, involves spelling and skill in reproduction (Bolo, 1973). Like speech, it is a means by which language is defined as a system of expression. Writing involves a process of activating the hand under the watchful control of the eyes, guiding movements, and making signs in space and time. In the act of writing, the eye is as important as the hand. Azemar is right to say that “(the eye) is a very richly innervated organ that is often seen as a sort of outpost of the brain, playing a major role in the perspective of anticipating certain events and preparing adequate responses” (2003: 228). It has both visuospatial and posturo-motor functions.

Reading and writing are, among other things, acts in which humans use language to exercise higher cognitive functions. They have a symbolic function requiring a match between the sensorimotor system and the environment. They require recognition and graphic training ability, cognitive competence, because one (writing) is underlying the other (reading). Reading is based on the spelling knowledge of words retained in long-term memory in the form of a lexical stock (Brun-Henin et al., 2012; Thierry & Yapi, 2017). Reading requires the normal and proper functioning of the eye, through which transfers between stimuli and the neuropsychological system are made. Similar to the role of the eye in writing, the

ear plays a role of recognition and validation of visuo-auditory stimuli when learning to read. Reading and writing are therefore two acts requiring lateral preference, whether left, right, or crossed. Reading being an activity of graphic and phonological transfer, it can be difficult to do in a language in which a young reader is not at ease on the oral side, as some authors recognize concerning the place of French as a language of instruction in Haiti (Bentolila & Gani, 1981; Bertrand, 2020; Lainy, 2020a).

7.1.3 Memories of an attempted dyslateralization or “delateralization”

In Haiti, school officials and teachers admit that the eye, the ear, and the hand are important in the process of learning and recognizing handwriting. But they seem unaware of the damage that the absence of adjustments for left-handed students can cause.⁴ There are regrettable impacts on the learning process and academic performance of this category of children. Many left-handers are forced to modify their laterality according to predefined and imposed educational and institutional formats (Lainy, 2020b). Having become adults, these people, formerly considered deficient and abnormal because of their left-dominated laterality, bear the stigma of these portrayals and these pedagogical strategies on the personal, psychosocial, and cognitive level. This is the case with Germaine,⁵ who retains memories of the atrocities she suffered while learning to read and write. Ridiculed for her awkwardness, right laterality was presented to her as the ideal option. She was forced to use her right hand for writing, because the left is considered inadequate and unfit to perform such a function.

Born in 1950, the only daughter of a father from the town of Aquin in Haiti, Germaine grew up in a single-parent family and began her education at the age of three. In less than five years, she attended three schools: the *Institution Mère de la Sagesse*, the *Institution du Perpétuel Secours de Bel-Air*, and the *Public school Cécile Lilavois*. Left-handed, Germaine had an early initiation into disorders of written language. While her natural hemispheric balance predisposed her to using her left hand for writing, she was forced to use her right hand. As Lauzon put it, her left hand was frustrated (2003: 90). She recounts:

I could write with my left hand, but Mère de la Sagesse (a Catholic nun) did not want me to write with my left hand. If I wrote with my left hand, she pinched me and punished me. She told me it’s not good to write with your left hand. Yet when I used my right hand the letters weren’t formed well, I told her so, but she always forced me to write with my right hand. I used to get good grades when I wrote with my left hand. I got stars in the notebook.⁶

Extract from interview with Germaine, Port-au-Prince, June 23, 2020

Germaine left school without completing the first two cycles of fundamental (AF1-AF6 / 1st grade- 6th Grade). She was so traumatized that she now confuses her right hand with her left hand. During this interview, we did a writing test to assess her preference for manual work and her writing skills. She used her right hand to write, but she insisted that it was her left hand. The pedagogical choices and educational preferences that forced her to write with the right hand have effects, but they have not erased what is naturally dictated by the cerebral hemisphere. Even though she uses her left hand for other functions, she uses her right hand to write, as the school insisted.

Her situation is similar to that of thousands of left-handed Haitian children. Legwo, another left-hander younger than Germaine, explains that he sometimes confuses his right hand with his left hand. Like Germaine, he bears the consequences of the stigmatization of which left-handed children are generally victims.

But the problem that I have always had, has been identifying what is the right hand and what is the left hand. I was totally confused. The other lefties in my class were also having the same difficulty. We were talking about this. We were confusing the right hand with the left hand.⁷

Extract from interview with Legwo, June 18, 2020.

Germaine was forced to write with her right hand. Legwo writes with his left hand, despite the threats and duress of his teacher at primary school. He could not, like right-handed people, apply the formulas of politeness, and use the geometric instruments. But despite this, he has had good academic performances. As a holder of a doctorate in anthropology, he is now a Professor-researcher at the university and author of dozens of scientific articles.

I was always a top student, but I couldn't get the hang of one subject. I couldn't draw geometric figures, because the instruments are designed for right-handed people. I wasn't comfortable on the school bench either.⁸

Extract from interview with Legwo, June 18, 2020

The classroom is not the only place where left-handers have been stigmatized, underestimated, and looked down upon. They have sometimes been looked down upon and forced to live like right-handers when they are not. Their teachers were unaware that they were teaching a mixed class. They did not adapt their teaching methods and did not arrange the students according to their laterality in the classroom.

To salute the flag in the morning, right-handed children used the right hand, but I couldn't, but I was asked to imitate them. It was a

real problem when I was learning to write. The teacher got annoyed because she was right-handed. I understand her now. Making the sign of the cross wasn't easy either. So, it wasn't just learning to write that was a problem for me. Remember that school is also a place of socialization, when you had to give a helping hand to people. It was hard. People laughed at me so much that I finally gave both hands to the person I wanted to greet. Another problem was my seat on the school bench. I was put in the middle of the bench. They didn't realize that I needed more space than a right-hander. The bench, the placement of the doorknob... everything was done for right-handed people.⁹

Extract from interview with Legwo, June 18, 2020

Depending on whether you are going out or entering a room, the lock of a door is to the left on one side and to the right on the other, which means that you have to use your right hand in one direction and the left of the door. But this trick was not simple for left-handed people like Legwo.

We know that the brain is an integrated organ where the right and left hemispheres function in balance (Desrosiers-Sabbat, 1993). However, it is generally not well understood what impact an imposed or even thwarted lateralization in the functioning of the sensorimotor organs can have on the cognitive development of students. With the exception of a discussion about the situation of left-handed and right-handed people in Haitian schools that Lainy attempted in a short article (2020b), research on the impacts of dyslateralization on children are almost nonexistent, whereas in the past and still today, left-handed people are the object of contempt and caricatures, the consequences of which are not trivial.

The stories from Germaine and Legwo outline the problems caused by educational and cultural choices that are not consistent with cerebral hemispherical predispositions. The space constraints that Legwo talked about seem to have been a handicap that affects the development of left-handed people. What happens, even today, when the laterality of children – visual, manual, or auditory – is modified according to traumatic contingencies, educational, or socio-cultural preferences? What impacts do the spatial arrangement and the teaching methods have on reading and writing performance? What is the impact of language during the graphic and phonological process?

Here are some hypotheses:

- 1) Forcing the use of a side not in accordance with the student's natural neurobiological system puts left-handed pupils automatically in a situation of handicap.
- 2) The ignorance of education officials forcing left-handed people to align with right-handed people impedes cognitive development and makes it difficult to learn to read and write.

- 3) Deficiencies in writing and reading often come from an underhanded attempt at dyslateralization, coming from the weakness of the education system.
- 4) Hearing comprehension leading to failure in ability to write.

7.1.4 Objectives

Our objectives included studying the impacts of educational and socio-cultural preferences on reading and writing performance, determining the influence of the management of the classroom environment, teaching materials and practices on the development of these students. The placement of left-handers in seating will also be studied to determine its impact on reading and writing performance.

7.2 Methodology

This study on laterality and performance in writing and reading in this population of students is based on, in addition to research on neuropsychology as mentioned above (Broca, 1861–1865; Hécaen, 1973; Sergent, 1999; Habib, 2009; Karolis et al., 2019; Neubauer et al., 2020), studies dealing with the learning of written language and sensorimotor disorders in young children. de Ajuriaguerra's approach (1964) to the evolution of writing and the posture of the writer has served as a point of reference. This study follows the theoretical framework of socioconstructivists (Vygotski, 1997; Doise & Mugny, 1997; Darnon et al., 2008) favoring socio-cognitive conflict in the acquisition of knowledge. The approach of Dehaene (2007), centered on the principle of “neuronal recycling,” and the hypothesis supported by Brun-Henin (2012), Sprenger-Charolles and Colé (2013) on the causes of dyslexia, are also considered.

7.2.1 The survey population

A population of students somewhat traumatized by the passage of Hurricane Matthew and the school environment formed the sample for our survey. The study examined the impact of the teaching methods, the placement of the pupils in the classroom, and the unsuggested asymmetry on writing performance and cognitive development. The differences in performance between handedness and the tasks to be accomplished, the pedagogies applied, and the educational means implemented are then considered.

Information on the trauma of this sample of students was collected using questionnaires administered before the period of *in situ* observation. This involved collecting data on their family situation, their educational and socio-demographic profile, the distance between their home and school, the academic and socio-professional profile of their parents,

their motivation, their attraction to learning, and their perception of disability. The sample numbered 120 students.

These respondents were selected according to the following criteria: the category of schools to which they belong, the class level and left-handedness. Thus, only students from the first two cycles of elementary school (3rd–6th grade) were recruited. Since this is a study of only left-handed students, right-handed people were automatically excluded. We proceeded to examine the 120 students for lateral crossing and difficulties experienced when using the left hand.

The 120 left-handers were attending ten schools located in the departments of the South and West. Six are national schools, two are public congregational schools, while two are private institutions. These are the public schools commonly called: *l'École nationale République du Paraguay*, *l'École nationale Célie Lilavois*, *l'École nationale de Roche à Bateau*, *l'École nationale de Garçons des Coteaux*, *l'École nationale de Port-à-Piment* et *l'École nationale de Chardonnières*. The two public congregational schools are *École Notre-Dame de Lourdes* and *École presbytérale de Chardonnières*; the two private institutions are the *Claire de Lune Institution (Port-au-Prince)* and the *Emmanuel Kant College*. The *Emmanuel Kant College* is a school in the city of *Cayes* enrolling children with severe pathologies and signs assimilated to disability.

Laterality tests were administered. The functions performed by the hand, eye, and ear were considered because these organs support, among other things, the learning of reading and writing. To identify and verify problems resulting from visual-auditory gaps, irregular use of the hand in writing practices and socio-cultural prejudices, we used simple auditory laterality tests. The control of laterality of use and of graphic laterality was administered in order to check the performance differences between the hands. Hand tests are done in connection with the functioning of the eye.

The analysis of visual and manual predominance led to experimenting with two strategies. Each subject was first asked to aim for a straight point through a 2-inch hole in a sheet of paper with a blink of an eye; we checked which of the two eyes saw the point. This was the first strategy. The subject's dominant eye check was also done by looking at a pen and blinking one eye after the other (eye preference test). To analyze manual predominance, each subject was asked to pick up an object, give the interviewer their hand, scratch their head, and write something on the board. Crossing tests of the hand and the eye, the eye and the ear were, among other things, carried out to evaluate possible synchronizations and to measure the involvement of these organs in the execution of the instructions. This was the second strategy. A hearing test was done to monitor auditory perception, and detect the dominant ear, using headphones. A test using the Electronica 600 M screening audiometer was administered. Students were fitted with Sennheiser HDA 300 headphones, intended for making and interpreting audiograms, dominant calculating hearing, and

determining hearing thresholds according to the “Hughson-Westlake” method,¹⁰ generating continuous and pulsed sounds.

The manual and visual-auditory tests were followed by a writing and written comprehension test, in order to verify and evaluate the linguistic productions of simple and more or less complex syntactic statements. I have used standardized tests like Alouette-Revised,¹¹ E.co.ss.e,¹² etc. We administered a questionnaire to assess the alterations caused by educational devices, traumatic contingencies, and socio-cultural impacts. This was done to assess the psychological state of this population of respondents (left-handed students). The screening audiometer was administered not to reveal hearing deficits, but only to identify dominant of each ear.

7.2.2 Writing and reading tests

Since there is a positive correlation between the preferred side for the hand and the eye (Fagard, 2016: 78), good performance could result. Writing and reading tests were thus proposed to detect possible impacts. Either extract (1):

My mother struggled, not knowing exactly what to do or where to go. My father, his arms raised in distress, ran everywhere, screamed, cursed the locusts, called on Allah! I made a firm decision to do my best, to show myself a worthy boy. I rushed to the hut where my parents lived. I took my bow and my three quivers loaded with arrows. A young warrior, properly armed, I walked over our field with a determined step.

Deschamps, 2018: 65

To check for possible recurrences and systematizations, we gave other tests to these same students. The following excerpt is an example:

The reckless little cat

I had a snub nose and a round face. My father nicknamed me “the little cat.” It made me want to imitate the cat. I got into the habit of crawling and meowing. My father worked on the second floor in the library. I used to go up there every afternoon when it was hot. When my father heard the meows of his little cat, he would come and open the door.

Deschamps, 2018: 108

Our selection of these tests followed the benchmarks predefined in the curriculum of the Ministry of National Education. We were inspired not only by standardized tests, but by what is prescribed in the manuals. We followed the instructions established in the manual from which the texts are extracted. The texts were chosen and administered as a reading and

writing test in order to judge the performance of the children in the sample in relation to the performance of the general population of students of the same age and the same conditions.

7.2.3 The questionnaires

We administered several questionnaires to collect data from students, teachers, school principals, parents, local authorities, and professionals working with people with disabilities. Questionnaires intended for pupils and teachers were used to collect data on the academic level and professional training of teachers, their perception of disability, learning arrangements, degree of flexibility, socio-psychological situation, attitude, and behavior toward students with disabilities.

7.3 Results of observations, tests, questionnaires, and administered tests

Since reading and writing are two processes jointly related to manual, visual, and auditory literalities, as previously indicated, performance and detection tests of the dominant hand and eye were carried out. Screening for perceptual-auditory hemispherical dominance was also administered. Audiometric tests successively presenting auditory stimuli to each ear made it possible to identify the dominant cerebral hemisphere, the connection between the dominant hand and the ear, and the impacts on performance obtained in writing and reading.

The observation sessions carried out did not favor boys. In a country like Haiti where women do not always have the same opportunities as men, where preferential treatment exists in many areas of life, we offer an example of inclusion that sends positive signals concerning the principle of gender equity and equal opportunity.

Of the 120 students, 47, or 39.2%, were female, while 73 or 60.8%, were male. According to our data a large number of students – 72, or 60% – have repeated school years two, three, and even four times. Many were of an advanced age, compared to the normal age for these classes. These significant delays in relation to the age standards in the Haitian school system create overcrowded classes which teachers struggle to manage. Among these over-aged students, we distinguish between those who repeat a class from academic necessity, and those who entered school late. On the subject of over-aging, we refer the reader to Pierre Enocque François, who published a much-cited work in 1998 although we feel his conception of over-aging needs to be revised and updated.

These students are in both cases over-aged compared to the average age of the class (students of 5th and 6th grades 15–18 years), however the nuances between late schooling and repetitions are specified in a note, to

avoid any amalgamation or any fanciful discourse on a group of students whose socio-economic situation did not allow them to go to school on time.¹³ Consider the following table showing the number and percentage of grade repeaters:

We note, in Table 7.1, repetitions and several cases of over-aged pupils. Apart from the problems linked to the ideas about left-handedness felt by those responsible for education (teachers and administrative staff), this phenomenon seems to result from the dyslateralization to which a good number of children are subjected and certain factors originating from the family and environmental environment. Comments and analyses will be made on the data collected to explain the impacts of these factors on the writing and reading process. Before we get there, let's take a look at the following table:

Table 7.2 repeats part of the data from Table 7.1, to better illustrate the phenomenon of crossing mentioned above. Observations show that, for some students, left-handedness corresponds with a dominant left eye and dominant left hand; in others, left-handedness corresponds with dominant

Table 7.1 Number, percentage, and age of left-handed repeaters by level of study

<i>Level/grades</i>	<i>Number of students</i>	<i>Age</i>	<i>Years of education</i>	<i>Grade repeaters</i>	<i>Percentage (%)</i>
2nd	18	7–8	4–5	8	6.6
3rd	30	11–15	7–11	18	15
4th	35	9–15	6–9	21	17.5
5th	25	11–15	7–10	19	15.8
6th	12	14–16	9–11	6	5
Total	100	X	X	72	60

Source: *The data in this table are taken from the survey registers carried out by the GIECLAT, from December 2019 to December 2020, in the departments of the South and the West.*

Table 7.2 Number of students by age group and data relating to the phenomenon of sensorimotor crossing

<i>Level/Grade</i>	<i>Number of students</i>	<i>Age/Years</i>	<i>Crossing of sensorimotor organs</i>		
			<i>Hand</i>	<i>Eye</i>	<i>Ear</i>
2nd–4th	18	8–14	Left	Right	Left
4th–6th	35	9–15	Left	Right	Right
4th–5th	25	11–15	Left	Right	Left
5th–6th	20	12–16	Left	Left	Right

Source: *The data in this table are taken from the survey registers carried out by the GIECLAT, from December 2019 to December 2020, in the departments of the South and the West.*

left eye and ear; in several cases left-handedness includes dominant left hand, right eye, and left ear, it also corresponds with dominant left hand, left eye, and right ear.

In our sample, ten students were dyslateralized. Their natural cerebral hemispheric laterality is therefore thwarted (Lauzon, 2003). These students can write with either hand, because they were, they say, forced to use their right hand when learning to write.

Left-handedness intersects in some cases with a dominant right eye and ear. Seventeen students had a left-hand cross with a dominant right eye and the dominant left ear. Cases of manual and visual predominance on the left, a percentage of 30%, also cross with the right ear. The majority of complete left-handers, namely those with the predominance of manual, visual, foot, and auditory totally on the left (Lauzon, 2003), i.e., a percentage of 53%, used the ear on their dominant left side during the hearing tests. This leads to the assumption that their dominant cerebral hemisphere is the right one, opposite the dominant left side. This hearing result was mainly obtained using a cell phone. To achieve this, we followed the test pattern published in *HealthDay News*¹⁴ that the Henry Ford Health System report suggested.

The reading and writing tests revealed discrepancies and gaps in the production and recognition of handwriting.

Thirty left-handed 6th students in the sample, aged 14–18 years, five of whom experienced dyslateralization, participated in exercises of copying text and dictation. These tests took more than 25 minutes to complete. The reading exercise was completed in 5–8 minutes. The scores obtained reveal difficulties in applying language syntax and prosody, spelling challenges, basic language skills, and mastery of vocabulary.

Table 7.3 brings together left-handed people forced to use the right hand (No 1, 3–6), and left-handed people using only the left hand (No 2, 7–11) for writing. Even if the sample had included only left-handed people frustrated because of poor understanding and management of left-handedness, the scores obtained show that the performance gaps are not significant. The group of frustrated left-handers known to be dyslateralized and the others were matched on variables such as: socio-economic problems, lack of mastery of the language of instruction, seating problems, and arrangements. This revealed other shortcomings; in almost all cases, clues to the existence of profound gaps in the formation of letters, the process of transfer between sound and writing, word writing, and formation of letters.

Although the texts indicated above were used for reading and as a dictation test, it was not strictly speaking a spelling test. Our focus was more on the quality and spacing of the written results. The extracts compiled in albums 1 and 2 below are selected to illustrate what we have observed and the related commentary.

Table 7.3 Writing performance and scores obtained by the sample of left-handers

No	Codes	Preference: Main eye		Age in year	Level grades	Dictated text words	Writing score/ Misspelled words
1	MontiENCL	Left/ right	Left	16	6th	82	19
2	MarceENCL	Left	Left	15	6th	82	16
3	MarvenENCL	Left/ right	Right	15	6th	82	34
4	VictoENCL	Left/ right	Left	15	6th	82	26
5	OdeENRP	Left/ right	Right	15	6th	82	16
6	RamonENRP	Left/ right	Left	15	6th	82	29
7	DariENRP	Left	Right	15	6th	82	15
8	ExuENRP	Left	Left	14	6th	82	18
9	MercyENCL	Left	Left	14	6th	82	9
10	CadeENRP	Left	Left	14	6th	82	15
11	SupreENRP	Left	Left	14	6th	82	10

Source: The data in this table are taken from the survey registers carried out by the GIECLAT, from December 2019 to December 2020, in the departments of the South and the West.

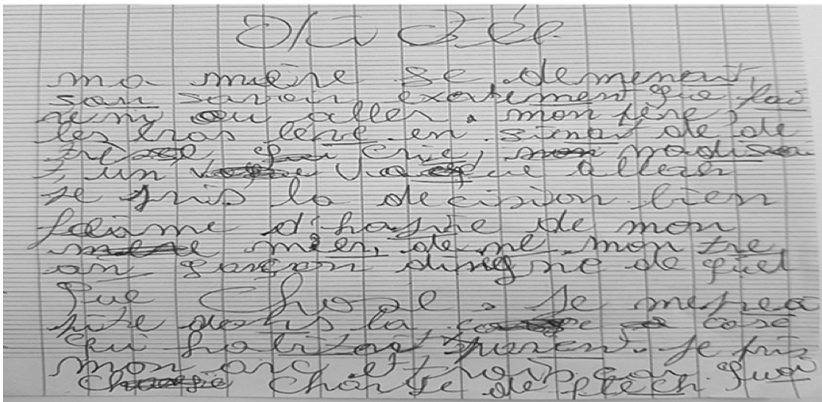


Figure 7.1 Sample of dictation produced by a left-handed dyslateralized 5th grade student. This student produced the dictation test after viewing the text for ten minutes. This test was administered by the RL researcher in a private school, November 20, 2020.

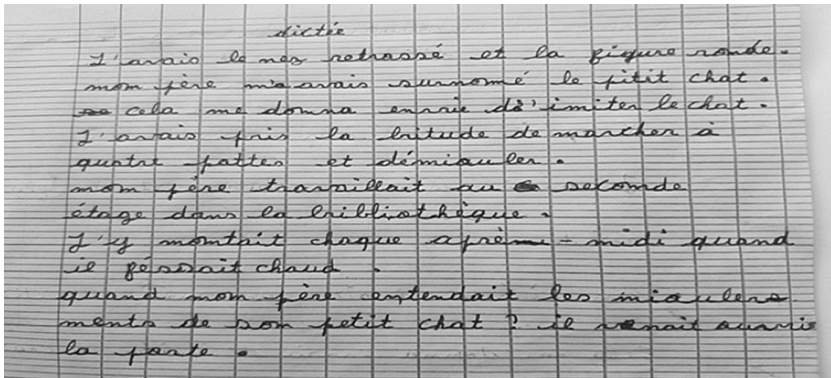


Figure 7.2 Sample of dictation produced by a left-handed dyslateralized 5th grade student. This student produced the dictation test after viewing the text for ten minutes. This test was administered by the RL researcher and an investigator in a public school, November 27, 2020.

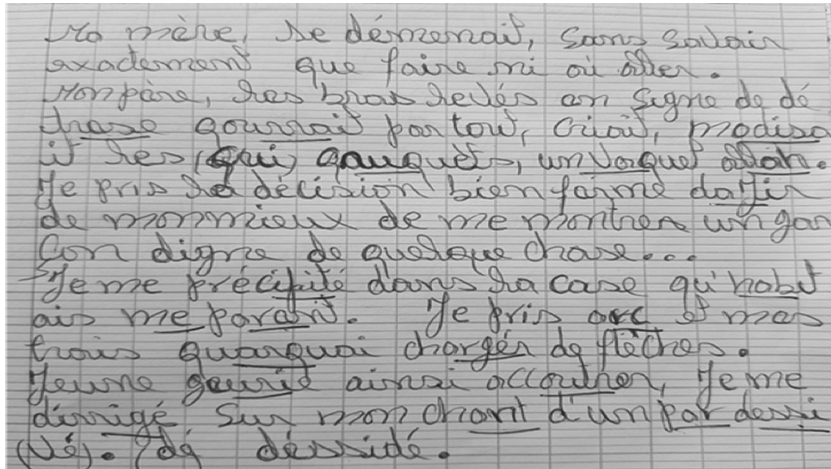


Figure 7.3 Sample of dictation produced by a left-handed dyslateralized 5th grade student. This student produced the dictation test after viewing the text for 10 minutes. This test was administered by an investigator in a public school, December 1, 2020.

These texts were chosen from the tests completed by this group of 30 students. These 30 students came from four public schools and two private schools and were selected from the sample of 120 mentioned above. The tests were administered on November 20, 26, 27, and 30, and December 1 and 2, 2020. The identity of these students and of their schools has been elided here.

Produced with the aim of studying performance in writing and reading, these texts reveal shortcomings that are likely to influence overall student performance. They show clumsiness in writing and in ability to read. They

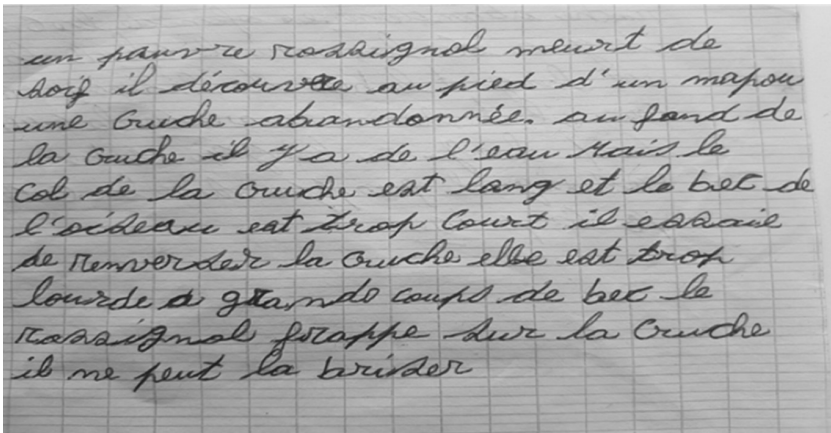


Figure 7.4 Sample of dictation produced by a left-handed dyslateralized 6th grade student. This student produced the dictation test after viewing the text for 10 minutes. This test was administered by an investigator in a public school, November 26, 2020.

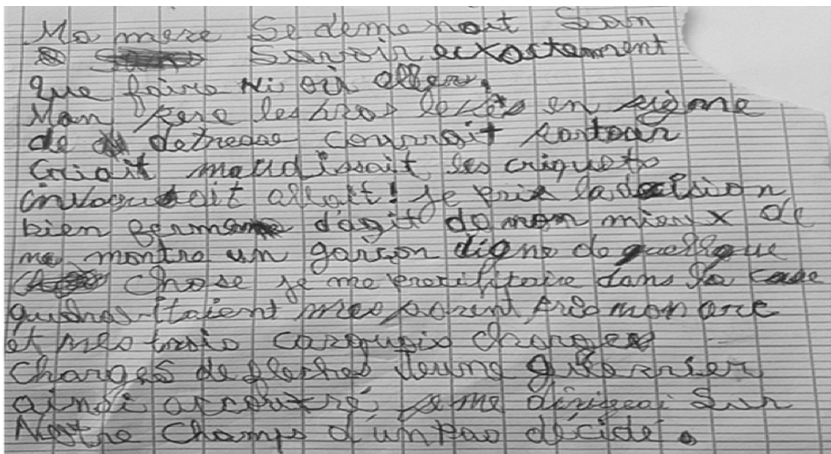


Figure 7.5 Sample of dictation produced by a left-handed dyslateralized 6th grade student. This student produced the dictation test after viewing the text for 10 minutes. This test was administered by the RL researcher and an investigator in a public school, November 27, 2020.

thus reveal shortcomings in the school system and the atmosphere in which these students struggle. What they reveal is also supported by the results of questionnaires administered to students and teachers. They confirm what we previously observed while examining student notebooks to get an idea of the writing performance of these left-handers.

These students mobilize their resources: neuropsychological assets and sensorimotor organs to produce linguistic signs and relate visual information and phonological information. The results shown in the images

provide information on perceptual-cognitive capacity and the writing they are able to produce. Significant effects of the difficulty of combining oral elements and written elements in French were identified.

7.3.1 Spatiotemporal constraints and the production of writing

Introducing a student to writing helps him to ultimately discover the organization of a complex system of transfers that he is called upon to understand in the dual process of construction and meaning. As the construction and recognition of graphic signs requires some knowledge of the writing system, the emphasis on time and space in which this process takes place is important (O'Connor, 1981).

Observations have shown that the sampled students are sometimes passive, and do not always understand what they write and read. Their awkwardness in the formation of minimal units of language (phoneme and moneme), the identification and production of the immediate constituents of the sentence (phrase and clause) can be observed at various levels. There are gaps in the use of the "third articulation of language"¹⁵ (Catach, 1994; Serça, 2004); difficulties in organizing the movements required for writing; lack of coordination in the use of hand and eye. Few students easily decode and recognize the linguistic units organized in phrase and proposition on the page.

Reading and writing exercises are laborious and relatively ineffective even in those who are normally proficient in terms of their biological age and years of schooling. The information we gathered showed that frustrated left-handed and non-frustrated left-handed people have proportionately more problems than right-handed people, even though the latter were not part of our survey sample.

Writing poses a huge challenge, not because they are left-handed, but because of the lack of methods and adjustments they need to thrive. These students are treated as if they were right-handed or predisposed to writing with the right hand. Their body posture generates an asymmetry in relation to the paper and the space in which they write. The rotational movements of the arm are slow and sometimes make awkward adjustments which rarely give good results. The majority reproduce the signs without taking into account the constraints imposed by the geometry of monemes and words organized in grammatical structure.¹⁶

According to the reports of some teachers, many were first taught writing at age 3, but have not shown regular progress since that time. After more than eight years of schooling for some, and as much as 11 years for others, they struggle to establish exact correspondences between the oral and the written. Wrong letter forms and poor layouts of letters on the paper are evidence that graphic space and environmental space are of no help.

Many left-handed students are seated in group seating which does not allow them to fit in. Two hindrances caught our eye. The first is that these

students, often placed in the middle of the row, have no room to use their left arm comfortably when their adjoining neighbors are all right-handers. The second is the fact that left-handed people in some schools are seated on chairs with writing tablets, permanently fixed on the right side of the seat. None are available for left-handed children, so these devices are as restrictive as the first. In both cases, left-handers have difficulty writing or drawing geometric figures. Table 7.4 presents a summary of the arrangement of these students on collective seats and chairs with writing tablets on the right.

As summarized in this table, these left-handed students occupy seating positions that do not always assist them in learning to write. Thirty-nine are seated to the right in a collective seat (bench), with the left hand facing inside; 30 are seated in the middle of the seat with the left hand facing

Table 7.4 Placement of left-handed students in classroom seating

<i>Code-Class and level</i> ¹⁷	<i>Number of left-handed students</i>	<i>Position of left-handed students in classroom seating</i>			
		<i>SSR < LHM</i>	<i>SSM < SSL</i>	<i>SSL < LGL</i>	<i>SWT < SWTR</i> ¹⁸
ICL-3rd-5th grade	12	0	0	0	12
ENRP-3rd-5th grade	28	14	9	5	0
ENCL-3rd-6th grade	27	9	10	8	0
ENDL-2nd-4th grade	4	0	0	3	1
ENG-3rd-5th grade	7	2	1	4	0
ENRB-3rd-5th grade	5	3	1	1	0
EPC-2nd-4th grade	4	1	2	1	0
CEK-2nd-4th grade	6	3	2	1	0
ENC-2nd-6th grade	15	5	5	5	0
EFAP-2nd-4th grade	12	2	0	1	9
Total: 12	120 LH	39 LHM	30 LHM	29 LHL	22 SWTR

Source: *Field survey and survey follow-up carried out by the GIECLAT, between December 2019 and December 2020.*

inside; twenty-two occupy individual seats with writing tablet on the right; while only 29 are seated to the left of the collective seat, with the left hand located to the left and free to use their left arm without constraint.

Observations that we carried out show us the following data: left-handed students enrolled in sixth grade of a private school writing in an uncomfortable situation; left-handed students in fourth grade of public schools writing in an uncomfortable situation; left-handed students in fifth grade of a public school writing in an uncomfortable situation; left-handed students in fourth grade of some private schools writing in an uncomfortable situation.

Left-handed students occupying the individual seat with writing tablet on the right do not have enough room to do their work. Because of lack of space, some of them are forced to impose on their neighbors. Their left arms intrude into the space needed by the right-handed students beside them, when they are in middle. Some students seem to need between 45–50 centimeters for writing, but only have between 30–40 centimeters. Others sitting at the end of the bench do not have space to use their left arms comfortably. They are colliding with the right arm of the students beside them. The situation is complicated. It seems that teachers and school principals ignore its negative impacts on students. Table 7.5 summarizes the arrangement of left-handers according to the types of seats:

By forcing left-handers to function as right-handers, educational system is trying to dyslateralize them. It is thus a sly attempt at dyslateralization which forces these subjects, already lateralized to some extent, to conform to standards in order to try to accomplish tasks.

Writing and drawing depend on space and are related to time. Proper use of these two instances (space and time) can facilitate satisfactory reading and writing performance, if used wisely. However, the spatial constraints are not explained solely by the fact that the majority of these left-handers are placed in the middle of a collective seat or seated on chairs *with a writing tablet located on the right*, but above all because the space

Table 7.5 Arrangement of left-handers and number of centimeters per occupied space

<i>Type of seating</i>	<i>Width of space allowed (cm)</i>	<i>Left-handed students</i>	<i>Delateralized or ambidextrous left-handers</i>
Group seating	30–40	59	10
Group seating	40–50	29	0
Individual seating	30–40	12	0
Chair with attached writing tablet	45–50	10	0

Source: *Field survey and survey follow-up carried out by the GIECLAT, between December 2019 and December 2020.*

assigned does not meet the requirements of their laterality. While a right-handed person seems to need a space of 30 to 40 centimeters to perform the act of writing, the rotational movement of the left arm appears to require a much larger space, between 45 and 50 centimeters. Right-handers usually write with the right arm bent forward, the upper arm close to the armpit, while left-handers are observed to rotate the left arm, elbow bent and the arm resting on the table.

The posture of the left-handers does not necessarily follow what Ajuriaguerra et al. (1964: 152) specifies as standards.¹⁹ Instead of having a straight body slightly tilted forward, head positioned in the same line as the body and a distance of about 20 centimeters between the desk and the head, left-handers generally tend to crouch down, with the arms bent and stretched out on the desk. The head does not follow the recommended distance for writing.

Not being comfortably seated, these left-handed students seem to need more time than right-handed people to complete a writing exercise or to take a test, but the data collected after the examination of the questionnaires shows that principals and teachers are unaware of the problem. Of 40 principals and teachers questioned about left-handed people in the classroom, only ten teachers agree that the placement of left-handed students does not allow them to write correctly.

Writing problems are identified using various factors and at several levels (see the images). We see poorly formed and mistaken letters, letters running together, ruled lines ignored, poor spacing of syllables and words, and variation in the height of the phonemes. The writing is unstable, illegible, and incomprehensible (see tests 1, 3–5).

The constraints in this learning environment are at the basis of impulsive, awkward, and tense writing for left-handers. Writings of the impulsive type comes from lack of control, or from writing too fast. Clumsy, compressed writing, with badly formed and disproportionate letters, disorderly and confused, results from movements marked by lack of practice in the gestures and poor control over the fingers. The evidence shown in albums 1 and 2 illustrate these two types of dysgraphia. We see shortcomings, malformed and uncompleted letters, sometimes entangled, sometimes isolated, often breaking the basic rules of writing.

7.4 Analysis and discussion

7.4.1 Socio-cognitive conflict and learning to write

Tests 1, 2, 3, and 4, illustrating the written performance of these students, reflect their level of attention and comprehension and perception of language. Their reading performance manifests itself in omissions and improper additions, an accumulation of clashes underlying ineffective written language learning caused by a lack of the supports necessary for school children (Lainy, 2020b).

These students resort to disturbance. This behavior has repercussions on the whole class, by treating of a climate of hyperactivity. Since a large percentage of these left-handed students, 60%, are among the oldest in the class, the younger ones pay the price. Teachers also pay the price, as they are sometimes overwhelmed and seem unable to work in a difficult atmosphere not conducive to teaching and learning. Attention difficulties from the school setting compromise the acquisition of knowledge and make these students depressed. They are correlated with an increased frequency of errors and gaps in speaking and understanding the language of instruction – French.

Deviations from written standards are a concern. They reflect shortcomings revealing the lack of understanding of the language syntax, the glaring shortage of adaptations to student needs and the context in which teachers carry out their work. Preferences and socio-cultural considerations seem to determine this educational context. We have identified data that allow us to assess the writing of these left-handers, in relation to the language constraint system, their arrangement in the classroom and the teaching devices, in order to better explain their characteristics.

We have observed that performance problems are not only linked to attempts at dyslateralization. From one teacher to another, the data collected via the questionnaires reveal a lot of awkwardness in organizing the classroom as a complex space of standardized and conventional meaning (Netchine-Grynberg & Netchine, 1989). The practical pedagogy does nothing about being inclusive with the aim of leading students to good results. Spaces are not allotted to allow left-handers to move without constraints in the learning process. Space for drawing is inseparable from writing (Grésillon et al., 1990), but the seats we use do not lead to good results.

Whether in public or private schools, the laterality of these students is not enhanced. Rather, they tend to move in the classroom like right-handed people. The standard that requires the writer to be seated comfortably with stable furniture adapted to his height (Bergeret & Clavel, 2006) is not respected here.

Pathologies affecting lateralization and differentiation between left and right are often described as a phenomenon of dyslateralization (Journet, 1972; Dailly & Moscato, 1984; Bala et al., 2010). Evidence and data collected, however, suggest a process that we prefer to qualify as “insidious dyslateralization,” because it is created by practices and methods that tend to force left-handed students to perform functions with a part of the body that cerebral hemispherical predispositions do not favor. These subtly imposed behaviors on these students produce the same problems and discomforts that Legwo reported. Left-handed people are forced to use their sensorimotor organs in an irregular rhythm compared to right-handed students.

The treatment inflicted on most of these left-handers is similar to that of which Germaine spoke above. The way they speak, organize language

clues, and match the sound and design of letters on the page, results from a school that struggles to include them. There has been a certain break in the stages of the formation of the letter, the syllable, and the word. Phenomena comparable to learning disabilities resulting from inadequate teaching techniques and methods are also observed.

The insulting views of the past, according to which left-handed pupils write badly and backward, are admittedly no longer accepted, but the conditions of schooling still deprive them of the arrangements that their laterality requires. The teachers do not seem trained or equipped to enable them to progress in the formation of letters. Being right-handed themselves and having never had the experience of rotating the left arm, they find it difficult to help these left-handed students in writing numbers and geometric figures.

The observations made in the classrooms we saw showed that these students are rarely involved in group activities that truly involve them as actors. The language they master, Haitian Creole, is not valued. The few places given to the exchange and confrontation of ideas as a fueling mechanism for socio-cognitive conflict reveal the existence of real gaps. The so-called “agonal” interaction approach is favored to the detriment of the so-called “amenity” approach (Pagès, 1987; Darnon et al., 2008); it causes aggression, lack of interest, dropping out and ineffective learning.

Socio-constructivism postulates that knowledge develops in inter- and intra-individual relationships (Vygotski, 1997; Doise & Mugny, 1997; Darnon et al., 2008, Buchs et al., 2008), between the learner and his environment. Here arises the genesis of the notion of “socio-cognitive conflict” that Pagès (1987) defines as an interaction which can be either “agonal” (conflictual, contradictory, annoying, controversial) or “amenitary” (affable, gentle, sympathetic). Darnon et al. note that “when conflict is associated with amenity, within a warm relational climate, it promotes learning. On the other hand, when it is associated with the expression of negative affects towards the partner, or aggression, conflict has deleterious effects on learning” (2008: 92).

Whether these are those with cross laterality, frustrated laterality, or those whose manual, visual, auditory, and foot laterality are identical, our data show that reading and writing performance are not satisfactory because of problems related to the socio-school environment and the educational systems in place. Students have difficulty with the spelling of new words; they have just seen and copying simple words they are assumed to know, depending on their age and number of years of schooling.

These copying exercises show that they should be given more time than expected to familiarize themselves with the basics of written French, because their perception is fundamentally codified from Haitian Creole. These students have visuospatial acquisition lacks and gaps that interfere with the perceptual-motor process. In their copying of short texts of 65 to 90 words taken from their reading manual *Pour lire avec plaisir*, we saw

enormous problems with written transcription. Difficulties with new words, with recognition of words expected to be known, two fundamental stages underlying the act of reading involving the mobilization of sensorimotor and cognitive powers (Sprenger-Charolles and Colé, 2013), illustrate the issues reported.

Lacks and gaps underlying spelling problems manifest themselves in different ways. They seem to arise from sensorimotor, psychological disorders and awkward sociolinguistic situations. In addition to the problems linked to the physical placement of these left-handed pupils and to the educational methods mentioned above, the task is further complicated because they are expected to learn to write in French, of which they do not have sufficient familiarity to make the link between oral and written. In other words, they know almost nothing of the basic grammatical structure. “By around 5 or 6 years old,” writes Dehaene, “the child has a detailed understanding of the phonology of his language” (2007: 264), and he will have enough knowledge to make the link between oral and written language. At this age, the child usually reaches a stage of linguistic development allowing him to begin to learn to write.

This author’s hypothesis makes sense where students are introduced to writing in a language they know. However, it doesn’t apply in the context of this study because these pupils face an introduction in a language which is foreign to them, and whose oral structure is not familiar. They cannot succeed, because they are forced to perform a double cognitive action consisting at once of transcribing, producing/reproducing signs capable of making the sound and spelling correspond, on the other, in processing and manipulating these signs to learn and express ideas.

The ignorance of the graphic and phonological system of the language seems to be a source of plodding pace and poor results as shown above. Students are encouraged to learn the language by means of writing, without being given time to understand the rules governing the transition from oral to written. This helps us see why they are unable to write with regular, smoothly produced letters and convert phonemes into graphemes.

The pseudo-words read and the particular difficulties in conversion/reconversion of the signs of writing into the sound of the language, a delay in learning written language, are not the only causes of anomalies we observed and identified. The drawing and writing problems come from factors ranging from body positioning to severe pathologies resulting from motor and sensory disruption provoked. The writing test reveals the gaps in writing skills that reveal students’ inexperience in overcoming certain obstacles.

The copied texts are illegible and incomprehensible (see the albums above) because the majority of the pupils are unable to organize and coordinate their writing. We noted a certain poverty characterized by recurrent mistakes. The results suggest gaps affecting both written language and

cognitive development. Difficulties in coordinating hand movements and visual perception are particularly striking. The frustrations of laterality (visual and manual) are among other causes of these difficulties.

7.4.1.1 Cognitive disorders and psychological impacts

The deficiencies observed have negative impacts on each individual student and on the whole class. According to the answers obtained in the questionnaires, the problems of writing are experienced as a personal failure. They have an impact on the overall academic record. Some students become anxious, others are aware of their situation and react badly. Some drop out and are more inclined to engage in activities that don't require reading or writing, others give in to disturbance and mockery.

As one of the main causes of school stigma and exclusion, these writing deficiencies give rise to problems in the school and its environment. Provoked laterality disorders and their consequences are visible, but teachers and principals don't seem overly concerned. Students are sometimes neglected and forgotten. Our investigation revealed that these students are sometimes victims of judgment – that they are bad or thick or stupid – which further complicates their educational future.

Some students become aggressive and show no interest in activities involving the cognitive system. They drop out, are more prone to distractions, and prefer physical activities. They experience situations with negative implications for their language and the development of their knowledge.

7.5 Conclusion

Persistent errors are observed in the production of signs and of grapheme-phoneme, phoneme-grapheme correspondences. The hypothesis of the existence of damaging gaps in reading and writing, characterized by the difficulty in carrying out perceptual-motor, neuropsychological, cognitive, and linguistic processes, suggests credible avenues. These left-handers are often forgotten, because the educational and school environment in which they operate was not designed for them. They are therefore disabled.

Poor reading and writing scores are obtained because their left laterality is not supported during the learning process and initiation to language activities. Sprenger-Charolles and Colé (2013: 14) note that reading difficulties arise from shortcomings in phonological processing; the data we collected corroborate this hypothesis, since the poor results reveal linguistic problems resulting from inappropriate and poorly engaged educational arrangements preventing pupils from thriving in learning to read and write.

These students read and write poorly because gaps in their understanding go undiagnosed. They struggle to accomplish their tasks because they

are positioned badly in the classroom. This helps us understand why they have neither the ability to form letters, nor the speed necessary to achieve readable and understandable writing. Graphic and motor deficits (so-called mechanical dysgraphia) and linguistic gaps (spelling disorders) block the writing process. As a complex cognitive activity (Brun-Henin et al., 2012), writing is hampered by perceptual-motor and graphophonological difficulties.

Dysgraphia is a neurological disorder. However, the tests we used were not administered to verify neurological conditions underlying the written language problems. To detect laterality and see what prevents students from progressing in learning to write, we mainly investigated academic and environmental facts. Management of time and space was also mentioned as a factor that could impact student performance.

Frustrated left-handers find it difficult to learn to read in a language other than Creole, their mother tongue, the language of which they have experience of auditory representation. When placed in setting more suitable for their handedness, we found that they are more comfortable making graphophonological links. Attempts at “underhand dyslateralization” are a worrying phenomenon because they negatively impact the reading and writing process. The data collected clearly showed that these students risk meeting the same fate as Germaine, if appropriate measures are not taken, at the educational, didactic, and psychological level, to allow them to learn according to their laterality. Their dyslateralization is constructed by the school and social context.

Notes

- 1 By adding the prefix “dys” to the “lateralization” word, I simply want to talk about cultural, social, educational, psychological, and familial issues that forced children to use a part of the organ that is not predicted by the cerebral hemisphere. This is a dysfunction.
- 2 The mouth is not included here.
- 3 Left-handed people are sometimes forced to do this.
- 4 Interview excerpts obtained from two principals and a teacher: “We don’t have a lot of left-handers here. What few we have are treated like other children” (a public-school principal). “Yes, in the past, we mistreated those who wrote with their left hand. We don’t do that anymore” (comment from a teacher at a religious school). “I have students with hearing and vision problems, but we cannot help them because of the lack of funds. I know that these organs are important for writing, reading and listening. To learn, you need all of these” (A nun from a public Congregational school).
- 5 The names of the participants are pseudonyms in order to respect confidentiality.
- 6 Translated from Creole to English.
- 7 Translated from Creole to English.
- 8 Translated from Creole to English.
- 9 Translated from Creole to English.
- 10 Electronica Medical 600M Audiometer on sale for 990 € (girodmedical.com).

- 11 Lefavrais P., 2005. Alouette-R, Domains investigated. Accuracy and speed of oral reading. Editions ECPA.
- 12 Lecocq Pierre, 1996, *L'E.co.s.se*. A test of syntactico-semantic comprehension, Presses Universitaires du Septentrion.
- 13 Apart from a few congregational schools and lay colleges where school age standards are met, in Haiti, data collected during this field survey showed that many students are past the expected school age for basic classes. We observed a large number of over-aged students, which might easily lead to a misapprehension that many of them were repeating classes. However, according to our evidence, it is more likely to be from late starts to school, because for economic and socio-family reasons, many children go to school very late. This increases the number of over-aged students.
- 14 Seidman Michael D. et al., 2020, Hemispheric Dominance and Cell Phone Use. *JAMA Otolaryngol Head Neck Surg.* 2013;139(5):466–470. doi:10.1001/jamaoto.2013.2889
- 15 André Martinet (1979) wrote in his conception of functional linguistics, of the double articulation of language. The first relates to monemes and the second relates to phonemes of meaning. The second articulation determines the first. However, it is important to note, according to the intuition of the enunciative linguistics of Benveniste and Culioli, that there is a so-called “third articulation of language”: rhythm and enunciation. The utterance is described as the first articulation and in this case seems to determine the other two.
- 16 Further study is needed to determine whether the treatment inflicted on the students in our sample affects all left-handed students in the Haitian school system.
- 17 The letters *ICL*, *ENRP*, *ENCL*, *ENDL*, *ENG*, *ENRB*, *EPC*, *EMP*, *ENC*, and *EFAP* are the initials of the names of the schools from which we selected these left-handed students. To maintain anonymity, we do not reveal the exact names.
- 18 Letters explanation: *SSR* = student sitting on the right side; *LHM* = left-hand in the middle; *SSM* = student sitting in the middle; *SSL* = student sitting on the left side; *LHL* = left-hand to left side; *SWT* = seat with writing tablet; *SWTR* = seat with writing tablet to right side; *LH* = Left-hand.
- 19 The standards described by these authors do not only concern left-handed people, but all types of students.

References

- Azemar, Guy, 2003, *L'homme asymétrique, gauchers et droitiers face à face*, Paris: Editions CNRS.
- Bala, Gustav, Špela Golubović & Ratko Katić, 2010, “Relations between handedness and motor abilities in preschool children“, *Collegium Antropologicum*, 34 (1), 69–75. <https://hrcak.srce.hr/51730>
- Bentolila, Alain & Léon Gani, 1981, “Langues et problèmes d'éducation en Haïti”, *Langages*, n°61, Bilinguisme et diglossie, sous la direction de Jean-Baptiste Marcellesi. pp. 117–127.
- Bergeret, Jeanne & Clavel Bérénice, 2006, *L'écriture des gauchers graphiques du CMI à la 5^e, Mécanismes graphomoteurs et ressentis scripteurs*, Mémoire, Université Claude Bernard Lyon-ISTR-Orthophonie, 94 p.
- Bertoncini, Josiane, José Morais, Ranka Bijeljac-Babic, Stephen McAdams, Isabelle Peretz & Jacques Mehler, 1989, November, “Dichotic perception and laterality in neonates”, *Brain and Language*, 37(4), 591–605.

- Bertrand, Jean-Wilfrid, 2020, *Lecture publique, problème de langues et alphabétisation en Haïti. La faim de lire dans un pays dit francophone de la Caraïbe*, Éditions Universitaires Européennes, 65 p.
- Bertrand, Pierre-Michel, 2001, *Histoire des gauchers "Des gens à l'envers"*, Paris: *Imago*.
- Bertrand, Pierre-Michel, 2011, *Nouveau dictionnaire des gauchers*, Paris: *Imago*.
- Bolo, Bernard A., 1973, "Qu'est-ce que l'écriture?", *Repères pour la rénovation de l'enseignement du français à l'école élémentaire*, 21, 59–63.
- Broca, Paul, 1865, "Du siège de la faculté du langage articulé", *Bulletins de la Société d'Anthropologie*, 6, 337–393.
- Brun-Henin, Florence, Jean-Luc Velay, Yaël Beecham, et al., 2012, "Troubles d'écriture et dyslexie: revue théorique, aspects cliniques et approche expérimentale", *Développements*, 13(4), 4–28.
- Buchs, Céline, et al., 2008, "Conflits et apprentissage. Régulation des conflits sociocognitifs et apprentissage", *Revue Française de Pédagogie*, 163, 105–125.
- Catach, Nina, 1994, *La ponctuation (Histoire et système)*, Paris: *Presses Universitaires de France*. coll. *Que Sais-Je?* 97 p.
- Dailly, Robert & Michel Moscato, 1984, *Latéralisation et latéralité chez l'enfant*, Pierre Mardaga (édi.), Bruxelles: P. Mardaga, 202 p.
- Darnon, Céline, et al., 2008, *Des conflits pour apprendre*, Grenoble: *Presse Universitaire de Grenoble*, 150 p.
- de Ajuriaguerra, Julian, et al., 1964, *L'écriture de l'enfant*, volume 1: *L'évolution de l'écriture et ses difficultés*, Paris: *Delachaux & Niestlé*.
- de Kerckhove, Derrick & Fernand Baudin, 1988, "Dominances cérébrales et systèmes d'écritures", *Communication et Langages*, 75, 5–23.
- Dehaene, Stanislas, 2007, *Les neurones de la lecture, préface de Jean-Pierre Changeux*, Paris: *Odile Jacob*.
- Deschamps, Henry, 2018, *Pour lire avec plaisir, No 7, Lecture en 7^e, # 4*, Henry Deschamps (Édi) Coll. F.I.C., 65 p.
- Desrosiers-Sabbat, Rachel, 1993, *L'enseignement et l'hémisphère cérébral droit*, Québec: *Presse de l'Université du Québec*.
- Doise, Willem & Gabriel Mugny, 1997, *Psychologie sociale et développement cognitif*, Paris: *Armand Colin*, 236.
- Du Pasquier-Grall Marie-Alice, 2001, « Les gauchers », *Idées reçues*. Paris: *Le Cavalier Bleu*, 239–248.
- Fagard, Jacqueline, 2012, "Aux origines de la préférence manuelle", *Enfance*, 1(1), 97–114.
- Fagard, Jacqueline, 2016, *Le développement des habiletés de l'enfant. Coordination bimanuelle et latéralité*, Paris: *CRNS Éditions*, 387 p.
- Faure, Sylvane, Michel Habib, Yves Joanette, et al., 2008, "Hémisphère droit, hémisphère gauche et cognition" in Francis Eustache (Ed.), *Traité de neuropsychologie clinique*. Bruxelles: *De Boeck Supérieur*, pp. 561–623.
- Flament, Fanny, 1963, "Développement de la préférence manuelle de la naissance à six mois", *Enfance*, 16(3), 241–262.
- François, Pierre Enocque, 1998, "Disparité d'âges des enfants dans les classes préscolaires. Cas des écoles protestantes dans le département du Sud", Marie-Lise Semblat (Ed.), *Collège Coopératif de Paris*, Paris: *Monographie d'observation*.

- Gréssillon, Almuth, Jean-Louis Lebrave & Violet Catherine, 1990, “On achève bien les... Textes“ in Tusson (Ed.), *Considérations sur l'inachèvement dans l'écriture littéraire, Documentation et recherche en linguistique allemande contemporaine – Vincennes, No 34-Proust à la lettre, Les intermittences de l'écriture*, Du Lérot, 34–65.
- Habib, Michel, 2009, “Développement de la dominance cérébrale: revue des données disponibles et proposition d'une hypothèse originale”, *Développements*, 2(2), 5–26.
- Hebting, Claude, 2003, *De la calligraphie à l'écriture*, Paris: Magnard.
- Hécaen, Henry, 1973, “L'asymétrie fonctionnelle hémisphérique et le comportement”, *Information (International Social Science Council)*, 12, 7–23.
- Hugel, Laurence, 2014, *Réflexions autour d'une prise en charge des coordinations bi-manuelles par la latéralité*, Institut de formation en psychomotricité, Toulouse: Université Paul Sabatier.
- Journet, Guy, 1972, *La main et le langage: la dyslatéralisation*, Paris: Editions universitaires, 240 p.
- Karolis, Vyacheslav R., Michel Thiebaut de Schotten, et al., 2019, The architecture of functional lateralisation and its relationship to callosal connectivity in the human brain. *Nature Communications*, 10, 1417. <https://doi.org/10.1038/s41467-019-09344-1>
- Lainy, Rochambeau (Ed.), 2020a, *Le handicap à l'école haïtienne. Résultats préliminaires d'une recherche-action dans le grand Sud d'Haïti à la suite de l'ouragan Matthew*, Québec: *Éditions science et bien commun*, 156 p.
- Lainy, Rochambeau, 2020b, “Gauchers ou droitiers. Rendement en lecture et écriture et dispositifs d'accompagnement”, in Lainy Rochambeau (Ed.), *Le handicap à l'école haïtienne. Résultats préliminaires d'une recherche-action dans le grand Sud d'Haïti à la suite de l'ouragan Matthew*, Québec: *Éditions science et bien commun*, chapitre 6, pp. 83–93.
- Lauzon, Francine, 2003, *L'éducation psychomotrice, Source d'autonomie et de dynamisme*, Québec: Presse de l'Université du Québec, 289 p.
- Martinet, André, 1979, *Linguistique fonctionnelle: débats et perspectives*, Paris: PUF.
- Morrell, Lenore K. & Joseph G. Salamy, 1971, “Hemispheric asymmetry of electro-cortical responses to speech stimuli”, *Science*, 174, 164–166.
- Netchine-Grynberg, Gaby & Serge Netchine, 1989, “La notion d'instrument psychologique e la formation de l'espace graphique chez l'enfant”, *Enfance*, 42(1–2), 101–109.
- Neubauer, Simon, Philipp Gunz, Nadia A. Scott, Jean-Jacques Hublin & Philipp Mitteroecke, 2020, “Evolution of brain lateralization: A shared hominid pattern of endocranial asymmetry is much more variable in humans than in great apes”, *Science Advances*, 2020(6), 1–12.
- O'Connor, N., 1981, “La perception auditive et visuelle, l'espace et le temps”, 1981, Association de psychologie scientifique de langue éd., *Les Enfants handicapés. Symposium de Barcelone*. Presses Universitaires de France, pp. 197–207.
- Pagès, Robert, 1987, “L'intelligence entre le conflit et l'aménité: à propos du conflit sociocognitif” in Beauvois, J.-L., et al., (Eds.), *Perspectives cognitives et conduites sociales 1: theories implicites et conflits*, Fribourg: Delval, pp. 249–284.
- Renault, Anna, 2016, *La main gauche. Médecine humaine et pathologie*, ffdumas-01484350.

- Rivière, James, 2000, *Le développement psychomoteur du jeune enfant*, Solal: Marseille.
- Scohy, Alain, 2012, *La latéralité biologique: un autre regard sur ce problème*. Éditions Néo sante. Consultée le 16 octobre 2020 sur le site: <https://www.neosante.eu/la-lateralite-biologique-un-autre-regard-sur-ce-probleme/>
- Serça, Isabelle, 2004, “La ponctuation: petit tour d’horizon”. *L’Information Grammaticale*, 102, 11–17.
- Sergent, Justine, 1999, “Les dilemmes de la gauche et de la droite, Opposition, cohabitation ou coopération?” in Xavier Seron (Ed.), *Psychologie et cerveau*. Presses Universitaires de France, pp. 121–151.
- Sprenger-Charolles, Liliane & Pascale Colé, 2013, *Lecture et dyslexie, approche cognitive*, Paris: Dunod.
- Thierry, Seka & Arsène Yapi, 2017, “Latéralisation Et Trouble Du Langage Chez L’enfant: Comprendre L’occurrence De La Dyslexie Et De La Dysgraphie À L’école Primaire”, dans *École Normale Supérieure d’Abidjan*, available URL: <http://dx.doi.org/10.19044/esj.2017.v13n32p170>
- Valière-Montaud, Martine, Gisèle Roth & Jean Ribo, 2003, *Oreille gauche, oreille droite: recherche sur la latéralité auditive*. Université Paul Sabatier, Toulouse III, U.E.R. Techniques de Réadaptation. 16 p.
- Vygotski, Lev, 1997, *Pensée et Langage*, 4e édition, Paris: La Dispute, 546 p.