



HAL
open science

French Pupils' Lexical and Grammatical Spelling from Sixth to Ninth Grade: A Longitudinal Study

Marie-Line Bosse, Catherine Brissaud, H el ene Le Levier

► **To cite this version:**

Marie-Line Bosse, Catherine Brissaud, H el ene Le Levier. French Pupils' Lexical and Grammatical Spelling from Sixth to Ninth Grade: A Longitudinal Study. *Language and Speech*, 2020, 10.1177/0023830920935558 . hal-02887461

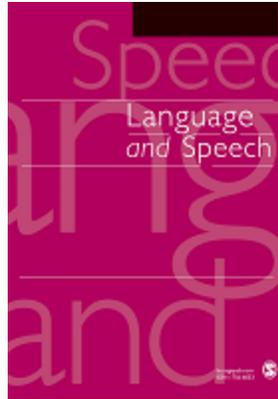
HAL Id: hal-02887461

<https://hal.science/hal-02887461>

Submitted on 11 Oct 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destin ee au d ep ot et  a la diffusion de documents scientifiques de niveau recherche, publi es ou non,  emanant des  tablissements d'enseignement et de recherche fran ais ou  trangers, des laboratoires publics ou priv es.



French pupils' lexical and grammatical spelling from sixth to ninth grade: a longitudinal study

Journal:	<i>Language and Speech</i>
Manuscript ID	LAS-19-0002.R4
Manuscript Type:	Original Article
Date Submitted by the Author:	n/a
Complete List of Authors:	Bosse, Marie-Line; Universite Grenoble Alpes Unite de Formation et de Recherche Sciences de l'homme et de la societe, LPNC Brissaud, Catherine; Universite Grenoble Alpes Laboratoire de linguistique et didactique des langues etrangeres et maternelles Le Levier, Hélène; Universite Grenoble Alpes Laboratoire de linguistique et didactique des langues etrangeres et maternelles
Keywords:	spelling, French, advanced learning, lexical orthography, grammatical orthography
Abstract:	This paper presents the results of a longitudinal spelling study conducted among 496 school children, from sixth grade (the first year of middle school in France) to ninth grade (the fourth and final year of middle school in France). Its first objective is to examine the evolution of both lexical and grammatical spelling skills in a deep orthography and to present new findings on the advanced mastery of spelling skills. Its second aim is to provide insight into pupils' orthographic knowledge and remaining difficulties at the end of French compulsory schooling. When students were sixth graders and when they were ninth graders, pupils were assessed using the same text dictation. The data show that both lexical and grammatical performance increased from sixth grade to ninth grade and that these interact with each other. The qualitative analysis of errors allows points of resistance in the acquisition of French orthography to be highlighted.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60



1
2
3
4
5
6 **French pupils' lexical and grammatical spelling from sixth to**
7
8
9 **ninth grade: a longitudinal study**
10
11
12
13
14

15 Short title: French pupils' spelling from sixth to ninth grade
16
17
18
19
20
21
22

23 Authors:
24
25
26
27

28 Marie-Line Bosse (1), Catherine Brissaud (2) & H el ene Le Levier (2)
29
30
31
32

33 (1) Univ. Grenoble Alpes, CNRS, LPNC, 38000 Grenoble, France
34
35

36 Univ. Savoie Mont-Blanc, LPNC, 73000 Chamb ery, France
37
38
39
40

41 (2) Univ. Grenoble Alpes, LIDILEM, 38000 Grenoble, France
42
43
44
45
46

47 For correspondence: marie-line.bosse@univ-grenoble-alpes.fr
48
49
50
51
52
53
54
55
56
57
58
59
60

Abstract

This paper presents the results of a longitudinal spelling study conducted among 496 school children, from sixth grade (the first year of middle school in France) to ninth grade (the fourth and final year of middle school in France). Its first objective is to examine the evolution of both lexical and grammatical spelling skills in a deep orthography and to present new findings on the advanced mastery of spelling skills. Its second aim is to provide insight into pupils' orthographic knowledge and remaining difficulties at the end of French compulsory schooling. When students were sixth graders and when they were ninth graders, pupils were assessed using the same text dictation. The data show that both lexical and grammatical performance increased from sixth grade to ninth grade and that these interact with each other. The qualitative analysis of errors allows points of resistance in the acquisition of French orthography to be highlighted.

Highlights:

Both lexical and grammatical French orthography are complex and take a long time to be totally mastered.

French pupils continue to improve their spelling performance, both grammatical and lexical orthography, between sixth grade and ninth grade.

Lexical and grammatical spelling skills do not evolve independently of each other throughout secondary school.

Spelling problems connected to the specificities of the French writing system persist in ninth grade.

Introduction

Spelling proficiency is highly valued in society, while a “persistent myth of declining” has also existed throughout the French-speaking world for many years (Allal, 1997). Thus, teaching orthography continues to be a huge challenge both for schools and for research, in a society where reading and writing are required more than ever (Fayol & Jaffré, 2014). In France, although time spent in primary and secondary school learning spelling remains substantial, the poor spelling level of pupils and students is regularly pointed out.

Moreover, the few studies designed to analyze the evolution of French pupils’ spelling over time are alarmist. They emphasize that a worsening in students’ performances is mainly observed in the so-called grammatical field, especially the inflectional morphology, requiring grammatical skills. In French, using phoneme to grapheme correspondences and lexical knowledge (i.e., knowledge of the forms of the words we can find in a dictionary) is not enough to write correctly. Indeed, morphological markers which must often be added to the base form of a word are mostly silent. For instance, unlike in English, the plural mark “s” is almost always silent: the pronunciation of the word *dollar* does not change from the singular *dollar* to the plural *dollars*, both pronounced /dɔlar/. The pronunciations of *il joue* (he plays) and *ils jouent* (they play) of the verb *jouer* (to play) are the same, /ilʒu/. One of the conclusions of the study commissioned by the department for evaluation, planning and performance of the French ministry of education (*Direction de l'évaluation, de la prospective et de la performance*) in fifth grade was the significant increase in grammatical errors (e.g., omission of the “s” or the “ent” in a plural form) from 1987 to 2007 and from 2007 to 2015, regardless of gender or socio-cultural origin (Andreu & Steinmetz, MEN-DEPP, 2016).

1
2
3 However, this increase was less pronounced for children from privileged social backgrounds
4
5 and for children who had never repeated a grade.
6
7

8 To our knowledge, only two cross-sectional studies give an overview of the
9
10 development of spelling skills of 11 to 15 years old students in French middle schools. In the
11
12 first one, Chervel and Manesse (1989) dictated to students a difficult literary text (a 17th
13
14 century text by Fénelon with complex morphosyntactic structures and unfamiliar
15
16 vocabulary) and they compared the results of students in 1987 with those of students of the
17
18 same age who took the same dictation exercise at the end of the 19th century. Manesse and
19
20 Cogis (2007) used the test in 2005, thus making it possible to compare the performances of
21
22 about 3000 students over time, that is from 1987 to 2005. In this cross-sectional study, the
23
24 authors demonstrated a clear increase in the number of grammatical errors over a 20 years
25
26 period, especially when a number agreement is required on an adjective or a verb, while
27
28 lexical performance remained stable. However, in 1987 and in 2005, the orthographic score
29
30 improved regularly from fifth to ninth grade. In 2005, the global enhancement between sixth
31
32 and ninth grade could be estimated at about ten percent, but the difference between the
33
34 improvements in grammatical performance and those in lexical performance was not
35
36 estimated. The second cross-sectional study was conducted by the *Direction de l'évaluation*
37
38 *et de la prospective* (DEP, 1996) in 1995 using dictation texts of the 1920s. The texts were
39
40 dictated to 12 to 14-year old students (sixth, seventh and eighth grade, first to third year of
41
42 middle school). Once again, the field of grammar was highlighted as a lingering problem in
43
44 the eighth grade.
45
46
47
48
49
50
51
52
53

54 In summary, both studies highlighted that the spelling ability of pupils in 2005 was
55
56 worse than the performance of pupils of the same age 20 or 70 years prior to this date,
57
58 although they always made regular progress from the beginning to the end of middle school.
59
60

1
2
3 It should be noted that these assessments were carried out with a literary, not necessarily
4 easily understandable, text. This worsening in students' performances is such an educational
5
6
7
8 issue in France that teaching grammatical spelling was more clearly than ever introduced in
9
10
11 the recently published high school curriculum: "Spelling skills remain a constant concern in
12
13 high school" (French Ministry of Education, 2019, p. 7). Teachers are now explicitly required
14
15 to teach the agreements in the nominal group and between the verb and its subject, and to
16
17 do grammar lessons and grammatical analyses with students from 9th grade.

18
19
20 All in all, the social cost of the now proven decline in spelling skills and the fact that
21
22
23 spelling performance is a good predictor of the quality of the texts that students will be able
24
25 to produce in the future (Daffern et al., 2017) justify further studies on both lexical and
26
27
28 grammatical spelling performances by pupils in middle school in order to design well
29
30 targeted instructional models.
31

32
33 Unlike longitudinal studies, and despite their strong focus on spelling performance
34
35 description, these cross-sectional studies do not help either to observe the evolution of
36
37
38 spelling skills of individuals over several years or to study the relation between lexical and
39
40
41 grammatical performance over the same period. To our knowledge, there is no longitudinal
42
43 study available on French spelling performance during middle school attendance. To fill this
44
45 gap, we conducted a longitudinal study. It consisted in having students take a dictation of
46
47
48 the same text in their first year and then in their fourth year of middle school (sixth grade
49
50 and ninth grade) to observe spelling performance in a text similar to those written by the
51
52 students on a daily basis, that is with accessible syntax and vocabulary. Notably, the text
53
54 used is not literary but it contains both lexical and grammatical French difficulties highlighted
55
56 by previous studies (e.g., Lucci & Millet, 1994), and numerous plural items.
57
58
59
60

1
2
3 Our purpose is to detail the evolution of spelling skills and difficulties in the French
4 language. First, this will begin with a short overview of French orthography and how it
5 works. A second part will be an overview of current knowledge on acquisition and on the
6 links between lexical and grammatical compounds. Finally, we will present our study.
7
8
9
10
11

12 13 **1. Linguistic approach of the French spelling system** 14

15
16 As many other alphabetic systems, French spelling is related to the spoken language
17 according to two main principles : the phonographic principle which allows the
18 correspondences between graphic units (graphemes) and oral units (phonemes) and the
19 semiographic one, enabling to use letters to represent significant forms (for instance the
20 plural). It is therefore a mixed system (Jaffré & Fayol , 2005).
21
22
23
24
25
26
27
28

29 Nevertheless, French spelling has some peculiarities which make its acquisition
30 especially difficult and resulted in a non-transparent spelling, compared to other European
31 spellings such as the italian or the Spanish ones. Three of these peculiarities have to be
32 highlighted: 1) It is characterized by a high rate of polyvalence of graphemes; 2) it is
33 characterized as well by the presence of many non-phonographic graphemes (in link with
34 history or derivational morphology); 3) flexional morphology has specific features, it largely
35 uses a number of non-phonographic silent graphemes (e.g., “s” or “t”, marks of agreement
36 for the person, “e” for the gender, “s” or “nt” for the plural) and results in a lot of
37 homophonic forms, especially for the forms of verbs ending with /e/.
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52

53 **1.1. A high rate of polyvalence of graphemes** 54

55 The alphabetic French writing system contains many phoneme-to-grapheme
56 correspondences. With about 30 phonemes matching more than 130 phonograms, there are
57 several ways to spell out many of them, especially vowels. For instance, /o/ can be written
58
59
60

1
2
3 “o” (65%), “au” (22%) or “eau” (11%); /e/ can be spelled “é” (44%), “e” (29%), “er” (19%) or
4
5 “ai” (3.5%) (Peereman, Lété, & Sprenger-Charolles, 2007). Accents were introduced into the
6
7 French writing system to distinguish vocalic sounds which did not exist in Latin, but their
8
9 introduction did not prevent other graphemes, including digraphs or trigraphs, from being
10
11 used for the same phoneme.
12
13
14

15
16 When several graphemes are possible, one is generally more frequent than the
17
18 others (“o” is overall the most common grapheme for /o/) but sometimes two graphemes
19
20 may be used with nearly the same frequency (e.g., “an” and “en” for /ã/, in *enfant-/ãfã/*
21
22 (child)). Moreover, depending either on the location in the word or on the grammatical
23
24 category, the frequency may vary: “eau” is the most common way of writing /o/ when
25
26 ending a word, and “é” is the most frequent end for /e/ in verbs. Conversely, some
27
28 graphemes can be read in different ways. For example, “ent” is read /ã/ at the end of nouns
29
30 or adverbs (e.g., *vent-/vã/* (wind)) but is silent at the end of verbs (present tense, sixth
31
32 person (e.g., *ils suivent-/ilsujiv/* (they follow)). This leads to difficulties even in reading, but
33
34 difficulties are far more important in spelling tasks.
35
36
37
38
39
40
41

42 **1.2. Many non-phonographic graphemes**

43
44 One of the important specificities of the French writing system is its graphemes with
45
46 no phonographic equivalent. These graphemes can be present at the beginning of a word
47
48 (e.g., “h” initial in *hâte-/at/* (hast)) but they are usually found in word endings. These
49
50 graphemes may be related to etymology or history (the last two letters of *temps-/tã/* (time),
51
52 from Latin *tempus*). Sometimes the spelling of words has been changed for etymological
53
54 reasons, as in *compte-/kõt/* (account), “m” and “p” being introduced to distinguish the word
55
56 from *conte-/kõt/* (a tale; both coming from Latin *computare*; Catach, 1995, p. 273; see
57
58
59
60

1
2
3 Coulmas, 2003, for similar examples in English : e.g., French *dette*, from Latin *debitum*, and
4
5 *samon*, from Latin *salmonem*, modified in *debt* and *salmon* in order to reflect Latin spelling).
6
7
8 This does not mean that users make the link between the silent letter or grapheme and the
9
10 origin of the word, however. Some mute letters have been added by analogy; for example,
11
12 to enrich a word which could appear to be too short (Cazal & Parussa, 2015; see Walter,
13
14 2001, for examples in English).
15
16

17
18 Some silent letters are in connection with derivational morphology and convey links
19
20 with other words from the same family - the “t” from *chat*-/ʃa/ (cat) is present in *chatte*-/ʃat/
21
22 (female cat) and *chaton*-/ʃatɔ̃/ (baby cat); the “t” from *petit*-/pəti/ (small) is present and
23
24 pronounced in *petite*-/pətit/ (small, feminine form) or *petitesse*-/pətitɛs/ (smallness). Silent
25
26 letters may also be remnants of a former state of a language. For instance, the words
27
28 *grammaire* or *année*, pronounced nearly everywhere today /ɡʁamɛʁ/ and /ane/, were once
29
30 pronounced /ɡrāmɛʁ/ and /āne/), the first “m” and “n” being used with the “a” to transcribe
31
32 the nasal vocalic phoneme /ã/. Pronunciation of these words changed with the so-called
33
34 denasalization phenomenon, whereas spelling did not.
35
36
37
38
39

40 As a consequence, most French words cannot be written easily based only on
41
42 phoneme-to-grapheme mappings (Véronis, 1988) and lexical knowledge is often required.
43
44 The French writing system is recognized as a highly opaque (non-transparent) system, far
45
46 more complex in spelling than in reading (e.g., Ziegler, Jacobs, & Stone, 1996).
47
48
49

50 51 **1.3. Specific features of French flexional morphology**

52
53

54 One of the most important specific features of the French writing system lies in its
55
56 final silent grammatical letters which result from a morphological erosion process. In the
57
58 past, French was spoken by Germanic settlers whose accent weakened word endings (Jaffré
59
60

1
2
3 & Fayol, 2006). French has a rich inflectional morphology, but the plural endings of nouns,
4
5 adjectives and verbs are no longer pronounced.
6
7

8 **1.3.1. Silent nominal and adjectival plural marks**

9
10 As we saw above, the “s” plural marker for nouns and adjectives is silent. Thus, the
11
12 singular and plural forms of nouns are usually homophones. The two forms of the noun *chat-*
13
14 /ʃa/ (cat, singular) and *chats-/ʃa/* (cats, plural, the “s” being inherited from Old French and its
15
16 two-case declension) are pronounced in exactly the same way. It is the same for the
17
18 adjective: for example, *agréable /agreabl/* (pleasant, singular) is pronounced like *agréables*
19
20 (plural). In contrast, in another Romance language, Italian, the plural is marked in both the
21
22 oral and the written form: *gatto-/gatto/* (cat) / *gatti-/gatti/* (cats).
23
24
25
26
27

28 **1.3.2. Homophonic forms spelled in different ways**

29
30 Verbs with an oral infinitive form ending with /e/ have 3 different written conjugated
31
32 forms in the present tense which are pronounced in the same way. The verb *trouver-/truve/*
33
34 (to find) is an example: *je/elle/on trouve* (I find, she/one finds), *tu trouves* (you find), *ils/elles*
35
36 *trouvent* (they find) are all pronounced /truv/. Some verbs where the oral form of the
37
38 infinitive ends with /ʀ/ operate the same way, such as *cueillir-/kæjiʀ/* (to pick up) or *ouvrir-*
39
40 */uvriʀ/*(to open): *on/j'ouvre, tu ouvres, ils ouvrent* (one opens, I/you/they open), where all
41
42 three of them are pronounced /uvʀ/ (Martinet, 1979). This applies to many regular verbs.
43
44 Furthermore, the verbal form can have a nominal homophone pronounced in the same way,
45
46 both in their singular forms: *il juge* (he judges) / *le juge* (the judge) and in their plural forms:
47
48 *ils jugent* (they judge) / *les juges* (the judges) are all pronounced /ʒyʒ/. The singular forms
49
50 can be spelled in different ways, although they are pronounced in the same way: *un appel* (a
51
52 call) and *il appelle* (he calls) both pronounced /apel/. The frequently used verb *voir* (to see)
53
54
55
56
57
58
59
60

1
2
3 has two possible nominal homophones when conjugated in the present tense (*je vois, il voit,*
4 *ils voient*, all pronounced /vwa/): *voix-/vwa/* (voice) and *voie-/vwa/* (way), *voies-/vwa/*
5
6 (ways) in the plural form (see Bosman, de Graaff, & Gijssels, 2006, for comparable examples in
7
8 Dutch).

13 1.3.3. The /e/ and /ɛ/ verb endings puzzle

16 The other main difficulty in French is undoubtedly the spelling of /e/ and /ɛ/ verb
17
18 endings. Here, mastering basic letter-sound correspondences is not sufficient because of the
19
20 neutralization of the two vowels /e/ and /ɛ/, which tends today to be pronounced in a
21
22 similar way in most places in French-speaking countries (Brissaud, Negro, & Fisher, 2012).
23
24 There are no less than nine commonly used different spellings for /truve/: *trouver* (infinitive,
25
26 to find); *trouvé, trouvée, trouvées, trouvés* (past participle, found); *trouvais, trouvait,*
27
28 *trouvaient* (imperfect tense, 1st, 2nd, 3rd and 6th persons respectively, found); and *trouvez*
29
30 (present tense, 5th person, you find)ⁱⁱ. This generalized homophony is the result of historic
31
32 evolutions; for example, “er” and “ez” have been pronounced in the same way since the 16th
33
34 century, following the muting of final consonants (Pellat & Andrieux-Reix, 2006).
35
36
37
38
39

40 Overall, in the French writing system morphemes definitely have something to do
41
42 with spelling (Bryant, Deacon, & Nunes, 2006) and the difficulties related to inflectional
43
44 morphology are well identified-silent marks of agreement for the person, gender and plural;
45
46 verbo-nominal homophony and /e/-/ɛ/ endings. French is therefore a special case among the
47
48 writing systems of the world. It falls within the same category as English in the orthographic
49
50 continuum of languages which ranges from the more phonographic to the more
51
52 semiographic systems, albeit for different reasons.
53
54
55
56
57
58
59
60

1
2
3 The specific linguistic characteristics of the French language we have just presented
4
5 explain why both lexical and grammatical aspects must be assessed to obtain a general
6
7 overview of spelling skills.
8
9

10 11 12 **2. Spelling development**

13 14 15 **2.1. From graphemes to morphology**

16
17 A significant amount of work has been carried out on the acquisition of orthographic
18
19 knowledge, in connection with reading, since the 1990s. The variety of types of knowledge
20
21 used when spelling stands out (Berninger, 1994). In all alphabetic systems, the first type
22
23 used is the knowledge of sound-to-letter correspondences that is the phonological
24
25 component (e.g., Sprenger-Charolles, Siegel, Béchenec, & Serniclaes, 2003). However, at
26
27 least in opaque systems like the French one, this knowledge is not sufficient and two other
28
29 categories of orthographic knowledge are also necessary to achieve proper spelling: lexical
30
31 knowledge (the knowledge that a certain word is written in a particular way, for instance
32
33 *femme-/fam/* (woman), *monsieur-/mæsjo/* (sir) or *enfant-/ãfã/* (child)) and grammatical
34
35 knowledge (corresponding in this paper to the inflectional part of morphology, i.e.,
36
37 graphemes most of the time with no phonographic counterparts). However, acquiring these
38
39 two kinds of knowledge is a slow and difficult process for children.
40
41
42
43
44
45
46
47
48

49 Children essentially acquire lexical orthographic knowledge through decoding and
50
51 spelling activities. Thus, this acquisition depends on decoding skills (Share, 1995) and could
52
53 also be influenced by visual processing of written words (Bosse, Chaves, Largy, & Valdois,
54
55 2015). Some persistent orthographic difficulties are also clearly linked to linguistic
56
57 characteristics such as grapheme inconsistency. For example, Fayol, Grimaud and Jacquier
58
59
60

1
2
3 (2013) observed that at the end of an intensive explicit teaching of lexical orthographic
4 patterns the hardest graphemes for second grade children to memorize were the **double**
5 **letters** and the phoneme /ã/ for which two graphemes (“an” and “en”) are used with
6
7
8
9
10 approximately the same frequency.
11
12

13 Applying the grammatical knowledge of syntax and morphology, especially
14 morphological regularities, is the other orthographic proficiency that is very hard and long to
15 acquire. As a matter of fact “the acquisition of grammatical skills requires abstract thinking
16 about the way language works and the corresponding graphic options available” (Jaffré &
17 Fayol, 2006, p. 85). The next sections will supply some elements about the complex
18 acquisition of grammatical knowledge, before highlighting the connection between different
19 kinds of orthographic knowledge during acquisition.
20
21
22
23
24
25
26
27
28
29
30

31 **2.2. Acquisition of French written morphology**

32
33
34

35 Regarding morphology, French deserves particular attention in two areas falling
36 within the inflectional morphology: 1) number and gender marks (especially “s” for plural
37 nouns and adjectives, “nt” for plural verbs, “e” for most of the feminine adjectives) and 2)
38 homophonous /e/ verbal endings (e.g., “é”, “er”, and “ez”). The question is: how is the
39 gradual automatization of the agreement rules processed?
40
41
42
43
44
45
46

47 **2.2.1. The acquisition of number and gender marks**

48
49

50 In their review devoted to the acquisition of number agreement, Van Reybroeck and
51 Hupet (2012) grouped the work carried out into three sets of research: the establishment of
52 stages of development, the identification of various cognitive mechanisms supporting
53 learning, and the contribution of morphological, syntactic and semantic information to the
54 implementation of grammatical agreement.
55
56
57
58
59
60

1
2
3 Regarding the first set, Totereau, Fayol, and Barrouillet (1998) suggested three stages
4
5 of development of the spelling of nominal and verbal numbers in French. **In the first stage,**
6
7 having been taught grapheme-to-phoneme rules, young children tend to omit the silent
8
9 plural ending and thus to make more spelling mistakes with plural than with singular words.
10
11 **In the second stage,** they understand the meaning of the “s” nominal mark for the plural, so
12
13 they use it for nouns and extend it to adjectives and verbs. **In the third stage,** they discover
14
15 and use “nt” for verbs with an overgeneralization for nouns. This developmental model was
16
17 established from the first to fifth grade but other studies showed that the use of plural
18
19 marks was not yet stabilized at the end of primary school attendance. According to
20
21 Alamargot et al. (2015), agreement is on the way to being automated in fifth grade but it is
22
23 only entirely automated by twelfth grade. Exploring the cognitive mechanisms at work when
24
25 spelling number agreement and the cognitive cost of mastering agreements in French, Largy,
26
27 Fayol and Lemaire (1996; see also Largy & Fayol, 2001) brought to light the variety of
28
29 resources and knowledge to be taken into account. This includes syntactical structures and
30
31 place of the verb. These authors showed that it is easier for adults to write a verb in the
32
33 plural when singular and plural forms differ in their pronunciation - (for instance: *ils*
34
35 *finissent*-/ilfinis/ (they finish), the oral form of which is different from *il finit*-/ilfini/ (he
36
37 finishes), is easier to write than *ils mangent*-/ilmãž/ (they eat) where the oral form is similar
38
39 to *il mange*-/ilmãž/ (he eats)). But the age for the automation of agreement processes
40
41 remains a vague notion and may be task-dependent.
42
43
44
45
46
47
48
49
50
51

52 Concerning the acquisition of the gender mark “e”, there is a clear lack of data, but it
53
54 seems acquired neither at the end of primary schooling (Cogis & Brissaud, 2019) nor at the
55
56 end of middle school (Brissaud, 2015). Finally, there is an interesting debate about number
57
58 and gender agreements. Do the marks really result from a rule being processed, or are
59
60

1
2
3 words' singular and plural forms (or masculine vs. Feminine forms) treated as entirely
4
5 different words? Actually, specific and very frequent instances seem to be recovered from
6
7 memory, especially in young children (Cousin, Largy, & Fayol, 2002), but inflectional forms
8
9 mostly depend on syntactic context and high level grammatical skills seem to be mainly
10
11 related to knowledge of grammatical information (Nadeau & Fisher, 2009).
12
13

14 15 **2.2.2. The acquisition of /e/-/ɛ/ verb endings**

16
17
18 A cross-sectional study from third grade to eighth grade provides a developmental
19
20 view of /e/-/ɛ/ verb endings in French (Brissaud & Chevrot, 2011). In first grade, pupils
21
22 mainly use a phonologically based rule; they use the “é” grapheme, the most frequent
23
24 spelling found at the end of words. In third grade, the use of the “er” morphogram appears
25
26 as a typical ending of the verb category (e.g., for the sentence /ilzɔ̃gɑ̃/ (they have won),
27
28 third graders could spell *ils ont gagner* instead of the right spelling *ils ont gagné*); from
29
30 fourth grade onwards, students understand that the verb is a varying unit and their spelling
31
32 repertory expands; they go back to the “é” grapheme which allows the agreement (*ils ont*
33
34 *gagnés* instead of *ils ont gagné*). The strong tendency towards making the agreement with
35
36 the unit situated just before the verb (usually, but not always, the subject) declines at the
37
38 beginning of middle school, although errors by adults are still reported (Fayol, Hupet, &
39
40 Largy, 1999; Lanoë, Lubin, Houdé, Borst, & De Neys, 2017). This evolution is interpreted by
41
42 the authors as a progressive morphologization. A longitudinal study conducted from sixth to
43
44 eighth grade confirmed this developmental view of /e/-/ɛ/ verb endings (Jaffré & Brissaud,
45
46 2006). This scenario is rather similar to the tests made on the acquisition of endings of the
47
48 past tense in English (Bryant et al., 2006). The pupils proceed by experimenting and making
49
50 successive adjustments, progressing in their understanding (see also Bahr, Sillian, Berninger,
51
52
53
54
55
56
57
58
59
60

1
2
3 & Dow, 2012). Clearly, the correct written forms are not stabilized straight away; rather,
4
5 there are intermediate phases.
6
7

8 The great variety of types of knowledge and the numerous cognitive and linguistic
9 factors (agreements with no oral counterpart and homophonic phenomena, overload) that
10 come into play make grammatical acquisitions complex. Spelling when writing is very
11 resource-consuming. The difficulties learners have to deal with are beginning to be
12 understood, but a detailed description of acquisition dynamics is still to be made.
13
14
15
16
17
18
19
20

21 **2.3. Relationships between different types of orthographic knowledge acquisition**

22 The role of morphology in the acquisition of literacy has been regularly highlighted,
23 especially in alphabetic languages with a non-transparent written system as English (e.g.,
24 Rastle, 2019) and French (e.g., Casalis, Deacon, & Pacton, 2011). It has been shown that very
25 young children are able to use morphological information without being taught how to
26 (Deacon & Leung, 2013; Treiman & Cassar, 1996; for more transparent orthographies, see
27 for instance Lehtonen & Bryant, 2005). Research has also shown that it is worth teaching
28 morphological awareness, which has been demonstrated to be a better predictor of reading
29 fluency and comprehension at a later age, than knowledge of phonology (Nunes, Bryant, &
30 Barros, 2012). In her integrative review, Carlisle (2010) insists upon the need to develop
31 methods for teaching morphological awareness in relation to other components of literacy
32 development, such as that explored by Nunes and Bryant (2006).
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50

51 Therefore, even if the dominant discourse remains centered on the alphabetic
52 principle, it seems that the coordination of multiple knowledge sources is important to
53 acquire the almost opaque alphabetic written systems (Bowers & Bowers, 2018; Castle,
54 Rastle, & Nation, 2018). However, few studies have examined how the various types of
55
56
57
58
59
60

1
2
3 knowledge (e.g., lexical and morphological) interact with each other. As far as English is
4
5 concerned, two studies using Triple Word Form Theory as a conceptual framework analyzed
6
7 Standard English spelling performance levels. In the first study, spelling errors of several
8
9 hundred students in first to ninth grade (collected in the 1990s) were analyzed quantitatively
10
11 and qualitatively (Bahr, Sillian, Berninger, & Dow, 2012). Spelling errors were classified into
12
13 phonological, orthographic, and morphological categories. The authors showed that as grade
14
15 level increased the number of orthographic and phonological errors significantly decreased,
16
17 whereas morphological errors increased in relative frequency until fifth grade. Moreover,
18
19 students experienced difficulties in the spelling of homonyms.
20
21
22
23
24

25 Daffern (2017) analyzed the coordination of phonological, orthographic and
26
27 morphological scores in a cross-sectional study carried out on third to sixth grade Australian
28
29 children. She found correlations among the three components of spelling. She observed a
30
31 reduction in the number of errors for every component as grade increased and a substantial
32
33 increase in performance between fifth and sixth grade in the phonological and
34
35 morphological components of spelling. However, morphological spelling remains difficult to
36
37 master in sixth grade, with inflectional suffixes being mastered before derivational ones. In
38
39 addition, she highlighted substantial differences in performance across all three subscales
40
41 for students in the lower percentiles compared to students in the higher percentiles.
42
43
44
45
46
47

48 As far as French is concerned, Morin, Alamargot, Diallo and Fayol (2018) recently
49
50 investigated the nature of the skills involved in two kinds of spelling: lexical (corresponding
51
52 to both phonological and orthographic components in English in the two studies quoted) and
53
54 grammatical (corresponding to the inflectional part of morphology), with 244 children from
55
56 third to fifth grade. They sought to identify different acquisition profiles, based on children's
57
58 lexical and grammatical development. They found that performance was higher for lexical
59
60

1
2
3 than for grammatical spelling. Both associations (lexical performance correlated with the
4 grammatical one) and dissociations (contrasting scores) have been observed, especially in
5 third grade. In the case of a dissociation (34.4% of pupils), poor grammatical performance
6 was coupled with good or very good lexical performance. The opposite profile was only
7 found for 4 pupils (1.64%). Notable improvements were observed between third grade and
8 fifth grade, with the lexical and grammatical aspects being more correlated in fifth grade
9 than in third grade.
10
11
12
13
14
15
16
17
18
19

20 **3. Relevance of the study**

21
22 In summary, the spelling acquisition of opaque orthographies seems to follow “a
23 gradual but complex trajectory” (Daffern, 2017), with a prominent individual variability.
24 According to a few cross-sectional studies, it seems that lexical and grammatical skills do not
25 improve independently during primary school education: significant correlations were
26 systematically observed between lexical and grammatical performance. Furthermore,
27 individuals with a dissociation between their lexical and grammatical performance almost
28 always have good lexical skills and poor grammatical skills, whereas the reverse pattern is
29 extremely rare. These results suggest an asymmetric dependency between lexical and
30 grammatical skills. However, further data is clearly needed to explore this hypothesis,
31 especially with longitudinal studies and studies in the secondary school. Few spelling studies
32 have addressed this age group for French children, and there is no available longitudinal
33 study of this type for the French language.
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50

51
52 The present longitudinal study has been conducted to give a better overview of
53 French spelling acquisition during secondary schooling. Our hypotheses are the following: 1)
54 there is a significant and positive evolution of French spelling performance between the
55 sixth and the ninth grade, with a more substantial evolution for the grammatical component
56
57
58
59
60

1
2
3 (this is still low in the sixth grade) than for the lexical one (relatively well-mastered in this
4
5 same grade); 2) there is a relationship between lexical and grammatical skill acquisition
6
7 because the two skills do not improve independently. More precisely, we propound the
8
9 hypothesis of an asymmetric dependency between lexical and grammatical skills, as is the
10
11 case in primary school (Morin et al., 2018); 3) difficulties, especially grammatical ones,
12
13 remain at the end of ninth grade and these are in connection with specificities of French
14
15 spelling.
16
17
18
19
20
21

22 **Method**

23 **1. Participants**

24
25
26
27
28
29 496 students (257 girls and 239 boys) attending 10 public secondary schools of the
30
31 Academy of Grenoble (France) took part in the longitudinal study. 168 students (33.9% of
32
33 the sample) were from two large urban secondary schools of Grenoble area, receiving most
34
35 of underprivileged and medium class population, 205 students (41.3% of the sample) were
36
37 from smaller institutions located in medium-sized cities with mixed population, 103 (20.8%
38
39 of the sample) were in secondary schools located in rural areas and 20 students (4%) were in
40
41 specialized classrooms for special education needs (cognitive or behavioral peculiarities).
42
43
44 Among the 476 students in normal classrooms, 31 (6.5%) reported being diagnosed with
45
46 dyslexia.
47
48
49

50
51 Participants took the first dictation when they were in the sixth grade, that is after
52
53 more than five years of real reading instruction. The recruitment was done in the context of
54
55 the ORTHOLEARN project (led by Sylviane Valdois, funded by the ANR (French National
56
57 Research Agency) and the CNRS (National Center for Scientific Research), a broader study
58
59
60

1
2
3 involving 960 sixth graders from eleven secondary schools). Three years later, a new team,
4 including one researcher from the ORTHOLEARN project, used the same text to have the 496
5 available students take the dictation again (464 students were unavailable for various
6 reasons, the essential ones being the exclusion of one secondary school that refused to
7 participate, students' or parents' refusal, relocation, grade repetition). The mean age of
8 participating students was 11 years and 10 months (SD = 5.6; range 10 years 4 months – 13
9 years 3 months) in sixth grade and 14 years and 7 months (SD = 5.6; range 13 years 2 months
10 – 16 years 0 months) in ninth grade. None of the participants had repeated a year between
11 sixth grade and ninth grade.
12
13
14
15
16
17
18
19
20
21
22
23
24
25

26 **2. Material**

27
28
29 The spelling performance of students was estimated with a text dictation task. The
30 text was written on purpose from the ROC test, *Repérage orthographique collectif* (collective
31 spelling monitoring, see Appendix 1)ⁱⁱⁱ, designed to identify poor spellers in fourth to seventh
32 grade. The ROC text was modified to include more grammatical spelling difficulties, such as
33 verbal plurals. The text dictated in sixth grade (Appendix 1) consisted of 67 words, and
34 contained the most frequently used tenses in written texts (present, infinitive and past
35 participle). In ninth grade, the dictation was the same text plus another paragraph of 45
36 words with additional lexical and grammatical difficulties (see Appendix 1).
37
38
39
40
41
42
43
44
45
46
47
48
49

50 **3. Procedure**

51
52
53 The first collection of dictations took place between February and June 2013 (sixth
54 grade). The second collection was carried out from January to March 2016 (ninth grade).
55
56
57
58
59 More time was needed for sixth grade pupils, because the project included more students
60

1
2
3 and more individual tests. The procedure was the same during both collections. Students
4
5 were first asked to listen carefully. The entire text was read aloud once by the experimenter.
6
7 Then the whole first sentence was re-read once. Then each segment of the sentence (see
8
9 Appendix 1) was dictated to the students. Each segment was slowly repeated twice and
10
11 students had to write it down. The same procedure was repeated for each sentence. At the
12
13 end of the dictation, neither the experimenter nor the pupils reread the entire text before
14
15 the sheets of paper were collected. Students were then asked to do other tasks
16
17
18
19
20 (questionnaires) not presented in this article.
21
22

23 ***4. Scoring and data analyses***

24
25
26
27 We calculated a common global score by summing the total number of words spelled
28
29 correctly in the common part of the dictation (out of 67 words) to be able to strictly compare
30
31 the same results in the sixth grade and in the ninth grade. For ninth graders, a specific ninth
32
33 grade global score, including all the ninth grade dictation, was also calculated (out of 112
34
35 words).
36
37
38

39
40 The common lexical score was calculated on 22 items of various frequencies (see
41
42 Appendix 1) and this comprised 12 nouns, 7 adjectives and 3 invariant adverbs. The specific
43
44 ninth grade lexical score also included 11 new items: 5 nouns, one adjective, 3 invariant
45
46 adverbs, one indefinite pronoun and one preposition and was calculated on a maximum
47
48 score of 33 items.
49
50

51
52 The common grammatical score was calculated on 13 items (6 “s” plurals at the end
53
54 of a noun, an adjective or a pronoun; 4 “ent” plurals at the end of verbs; 1 “er” end of an
55
56 infinitive verb; 1 “e” feminine mark and the plural pronoun “ceux” (those) which is
57
58 homophonic to “ce” (this)). The specific ninth grade grammatical score also included 9 new
59
60

1
2
3 items (2 “s” plurals; 1 “e” feminine mark; 1 “er” end of an infinitive verb; 2 “é” ends of a past
4
5 participle; 2 “t” ends of verbs (*décrit* et *voit*) and “est” (is) which is homophonic to “et”
6
7 (and)). Details of all items and their insertion into the global text are provided in Appendix 1.
8
9

10 11 12 **Results**

13
14
15 First, we present results on the global scores, lexical scores and grammatical scores
16
17 according to grade. The hypothesis that enhancement between sixth and ninth grades would
18
19 be stronger on the grammatical score than on the lexical one was tested with a mixed model
20
21 analysis. Correlation and regression analyses were conducted to study the dependency
22
23 between lexical and grammatical scores, in each grade and between grades. Then we
24
25 concentrated on persistent difficulties by focusing on the items showing more than 25% of
26
27 errors in ninth grade. The score data were analyzed with the R computing environment (R
28
29 Core Team, 2018; RStudio version 1.1.456) by means of a generalized linear mixed model
30
31 using the glmer function and specifying family=binomial.
32
33
34
35
36
37
38
39

40 **1. Performance enhancements between sixth and ninth grades**

41
42
43
44 Mean and median scores (standard deviations are given in brackets) of the dictation
45
46 are presented in Table 1. The global scores increased significantly from sixth grade (79.5%)
47
48 to ninth grade (88.4% for the common part, $t(495) = 21, p < .001$; 86.7% for the entire
49
50 dictation, $t(495) = 17.1, p < .001$), revealing an enhancement of spelling skills among French
51
52 students between sixth and ninth grade.
53
54

55
56
57 A mixed model analysis was performed to evaluate the specific enhancement of both
58
59 lexical and grammatical scores between sixth and ninth grades. Grade and type of scores
60

1
2
3 (lexical vs. grammatical scores on the common part¹) were the two within-subject variables.
4
5 As gender difference is frequently observed for orthographic performance (e.g., Berninger,
6
7 Nielsen, Abbott, Wijsman, & Raskind, 2008; Katusic, Colligan, Barbaresi, Schaid & Jacobsen,
8
9 2006), we also included gender as a between-subject variable. Initially, a maximal random
10
11 effects structure was specified, which included all subject and item random intercepts and
12
13 random slopes (Barr, Levy, Scheepers, Tily, 2013). As this model failed to converge, following
14
15 Barr et al., (2013) suggestions, we first removed random interactions and then dropped
16
17 random slopes associated with the smallest variance, until the model converged. The
18
19 converged mixed model² included random intercepts for participants and items, random
20
21 slopes for participants according to grade and type and random slope for items according to
22
23 grade.
24
25
26
27
28
29

30 The results (see Figure 1) revealed main effects of grade ($z = 11, p < .001$), type ($z =$
31
32 $3.8, p < .001$) and gender ($z = -3.7, p < .001$). Grammatical scores were lower than lexical
33
34 ones and girls obtained higher scores than boys. The interaction between gender and grade
35
36 was significant ($z = -2.6, p < .01$), suggesting that the enhancement between grades is larger
37
38 for girls than for boys. The interaction between gender and type was also significant ($z = -3.1,$
39
40 $p < .01$), suggesting that the difference between lexical and grammatical scores is larger for
41
42 boys (25%) than for girls (19%). Neither the interaction between grade and type nor the one
43
44 between the three variables were significant (respectively, $z = -1.4$ and 1.3).
45
46
47
48
49
50
51
52

53
54 1

55
56
57
58 The same results were obtained when using the scores on the entire dictation for ninth grade
59 ² `glmer (score ~ grade * type * gender + (1 + grade + type || participant) + (1 + grade || item), data =`
60 `orrm, family = "binomial")`

Table 1: Mean/and median/ global spelling performance, lexical and grammatical scores (standard deviations) of the 496 sixth grader and ninth grader participants, expressed as a percentage of correctly spelled items

	Common part 6 th -9 th	All 9 th dictation
Global spelling	percent on 67 words	percent on 112 words
sixth grade	79.5/81.4/ (13.5)	
ninth grade	88.4/89.6/ (10.1)	86.7/88.4/ (10.9)
Lexical scores	percent on 22 items	percent on 33 items
sixth grade	76.8/81.8/ (14.3)	
ninth grade	88.7/90.9/ (10.8)	81.5/84.8/ (9.7)
Grammatical scores	percent on 13 items	percent on 22 items
sixth grade	49.3/46.2/ (28.3)	
ninth grade	72.6/76.9/ (26.3)	72.0/77.3/ (24.0)

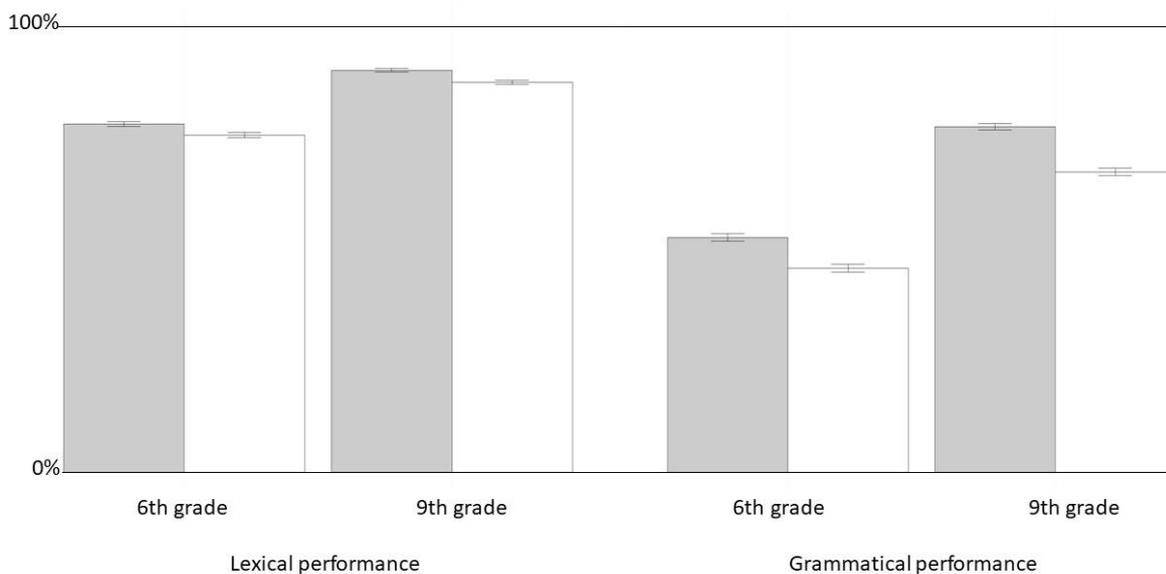


Figure 1 : Mean lexical and grammatical performance (and standard errors) of girls (grey bars) and boys (white bars) as a function of grade.

2. Relation between lexical and grammatical performance across grades

Correlations (Table2) are presented to reveal the relations between global, lexical and grammatical scores. All correlations are highly significant. Concerning the intra-grade correlations, trivially the global scores are highly correlated with both lexical and grammatical scores (from .80 to .89). The correlations between lexical and grammatical scores are significant but seem smaller (.48 in sixth grade and .69 in ninth grade), suggesting that at these grade levels some students could still present a dissociation between their lexical and grammatical performances. This was also true at earlier grades (Morin et al., 2018).

Table 2: Correlations between global, lexical and grammatical scores in sixth grade (scores on 67, 22 and 13 items respectively) and ninth grade (scores on 112, 33 and 22 items respectively). Partial correlations controlling for gender effect are presented above the diagonal.

		6th			9th		
		global	lexical	Grammatical	global	lexical	Grammatical
6th	Global	--	.83***	.80***	.72***	.64***	.70***
	Lexical	.83***	--	.48***	.60***	.61***	.54***
	grammatical	.81***	.49***	--	.65***	.52***	.70***
9th	Global	.72***	.61***	.66***	--	.86***	.89***
	Lexical	.65***	.61***	.53***	.87***	--	.69***

	grammatical	.71***	.54***	.71***	.89***	.69***	--
--	-------------	--------	--------	--------	--------	--------	----

*** $p < .001$

The inter-grade correlations are all significant and quite homogeneous, with the lowest r values for the lexical-grammatical correlations (.52 and .54) and the highest r value for the correlation between global scores (.72). To specify the dependency between lexical and grammatical performance between grades, two regression analyses were conducted, one for each of the individual scores of ninth grade (hereafter referred to as lexical-9 and grammatical-9). In each analysis, the global sixth grade score (hereafter called global-6) was entered at the first step to control the influence of general orthographic skills. It is expected that a large part of the variance in ninth grade performance should be explained by general orthographic skills in sixth grade. The sixth grade score corresponds to the score to be explained (lexical-6 to explain lexical-9, grammatical-6 to explain grammatical-9) was then entered at the second step and the other score (grammatical-6 to explain lexical-9, lexical-6 to explain grammatical-9) at the third step, as potential additional predictors. The detailed results are shown in Table 3. The analysis of lexical-9 confirmed that lexical-6 is significant but also revealed that grammatical-6 is still significant at the final step, predicting a small but significant part of the variance of lexical-9. The three scores of sixth grade together explained 44.9% of the variance on lexical-9 ($F(3,492) = 133.2, p < .001$). The analysis on grammatical-9 also showed that lexical-6 explained a small but significant part of the variance, after control of the variance explained by both global-6 and grammatical-6. The three sixth grade scores together explained 56% of the grammatical-9 variance ($F(3,492) = 208.62, p < .001$). These regression analyses suggest that lexical and grammatical performances do not evolve independently during education in secondary school.

Table 3: Results of the regression analyses on the lexical and grammatical scores in ninth grade predicted by the 3 different scores in sixth grade.

9 th lexical score				9 th grammatical score			
	ΔR^2	Beta (final step)	$t(492)$ (final step)		ΔR^2	Beta (final step)	$t(492)$ (final step)
Step 1 global	.420***	.165	1.55	Step 1 global	.497***	.200	2.10*
Step 2 lexical	.017***	.366	5.03***	Step 2 grammatical	.058***	.480	7.93***
Step 3 grammatical	.012**	.221	3.26**	Step 3 lexical	.004*	.143	2.20*

*** $p < .001$. ** $p < .01$. * $p < .05$

To observe the stability of the dissociation between lexical and grammatical performance over grades at an individual level, we first identified the sixth graders presenting a clear lexical-grammatical dissociation, that is showing one score lower than the 25th percentile and the other score higher than the 50th percentile. Then we followed these students in ninth grade. We found that 33 (6.7%) of the sixth graders had a low grammatical score but a good lexical one. The reverse dissociation (a low lexical score but a good grammatical one) was rarer in sixth graders, with only 13 students (2.6%) presenting this pattern. Three years later, the profiles of the 33 students with a good lexical-poor grammatical pattern, varied a lot. Ten of them still had a grammatical score below the 25th percentile, but the dissociation with the lexical score was then clear for only two of them (the lexical score had deteriorated for the other eight). Sixteen presented a grammatical

1
2
3 score above the 25th but below the 50th percentile, with most of them still presenting a good
4
5 lexical score. Finally, seven reached a grammatical score above the 50th percentile in ninth
6
7 grade and maintained their lexical score at the same level. The future of the 13 students
8
9 from sixth grade who presented a good grammatical-poor lexical pattern is more
10
11 homogeneous: nine of them achieved both lexical and grammatical scores above the 50th
12
13 percentile in ninth grade. In summary, it seems that lexical and grammatical performances
14
15 do not evolve independently of each other during secondary school attendance. However,
16
17 progress concerning grammatical orthography may appear later and may be harder to
18
19 obtain than lexical orthography progress, suggesting an asymmetric relationship.
20
21
22
23
24
25
26
27

28 **3. Exploratory analysis of persistent errors**

29
30 In this section, we first explore the main characteristics of lexical errors and second
31
32 those of grammatical ones. For each type, we first discuss the principal difficulties for both
33
34 sixth and ninth graders. Then, we focus on the errors that persist into ninth grade. We
35
36 considered the percentage of correct responses for each of the items (see Appendix 2 for
37
38 lexical items and Appendix 3 for grammatical items) and described errors on the items that
39
40 are still difficult for ninth graders to spell (items written with an error by at least 25% of the
41
42 students, see Appendix 4).
43
44
45
46
47

48 **3.1. Lexical item error analysis**

49 *Frequency, consistency and length effects*

50
51
52
53 Despite the fact that lexical items (Appendix 2) and grammatical items (Appendix 3)
54
55 are various and are not strictly built for a comparison between different categories, one
56
57 could ask whether some characteristics of the items could influence their spelling. Trivially,
58
59
60

1
2
3 for lexical items it is expected that frequently seen items will be better learnt, and thus
4
5 better spelled. Indeed, the 10 most frequent items are correctly spelled by 89% of sixth
6
7 graders, and the 10 rarest items by only 64% (these percentages are 95% and 80%
8
9 respectively for ninth graders). The phoneme-to-grapheme consistency could still be a
10
11 relevant factor in sixth grade (83% versus 75% correct for the most consistent and the most
12
13 inconsistent items respectively) but not in ninth grade (84% versus 90%). Concerning item
14
15 length, the 10 longest items are correctly spelled at 72%, and the 10 shortest items at 80% in
16
17 sixth grade. These percentages are respectively 83 and 86% for ninth graders, suggesting
18
19 that item length is probably not a central factor to explain persistent spelling difficulties.
20
21
22
23
24

25 *Persistent lexical difficulties: accents, double letters and homophones*

26
27
28 Concerning the persistent lexical difficulties, two of the worst spelled items were two
29
30 long words *précisément* - /pʁesizemã/ (precisely) had only 38.3% correct spelling (33.1% in
31
32 sixth grade), and *perfectionn(é)* - /pɛʁfɛksjɔne/ (sophisticated), only 73.4% correct spelling
33
34 (39.1% in sixth grade), without considering errors on the final “é”, which could be classified
35
36 as a grammatical error. The third worst spelled is a short word *vieil*-/vjɛj/ (old, masculine
37
38 adjective); old (masculine) is currently written *vieux* but exceptionally *vieil* when placed
39
40 before a noun that begins with a vocalic phoneme, like *homme*-/ɔm/ (man)), with 37.1%
41
42 correct spelling (not written in sixth grade).
43
44
45
46
47

48 Concerning *précisément* and *perfectionné*, the most frequent errors (reported in
49
50 Annexe 4) are linked to the use of the acute accent and the presence of double letters. For
51
52 the item *vieil*, the only phonologically plausible error was *vieille* (38.6%). This is a more
53
54 frequent homophone (feminine version of the adjective, old). The other frequent errors
55
56 highlight difficulties in spelling the phoneme /j/: *Vielle* and *viel* (both pronounced /vjɛl/,
57
58 together account for 45.7% of errors).
59
60

1
2
3 Overall, the results show that lexical performance continues to improve between
4 sixth grade and ninth grade. The analysis of persistent lexical errors suggests at least four
5 persistent orthographic difficulties for French ninth graders: the accentuation on the letter e,
6 especially when it appears in the middle of a word and has to be pronounced /e/ or /ɛ/
7 (Lucci & Millet, 1994), the presence or absence of **double** consonantal letters (with no rule to
8 explain this), the spelling of the semi-vocalic phoneme /j/ and the issue of homophones
9 (Bahr, Sillian, Berninger, & Dow, 2012).
10
11
12
13
14
15
16
17
18
19
20
21
22

23 **3.2. Grammatical item error analysis**

24 *The use of the plural mark according to an item's grammatical class*

25
26 For grammatical items, it seems that the plural mark is more frequently spelled on
27 nouns than on adjectives at both grades: respectively 65% versus 31% in sixth grade, and
28 78% versus 58% in ninth grade. The percentages of correct responses for verbs ending with
29 "é" and "er" (/e/) are respectively 76% and 75% in ninth grade (in sixth grade, only one verb
30 ending with "er" figured, and this was correctly spelled by 63% of the students). The "nt"
31 plural mark at the end of verbs is correctly spelled by 70% of sixth graders when the plural
32 form is phonologically different from the singular form, but this plural mark is correctly
33 spelled by only 47% of the same pupils when the plural form is phonologically the same as
34 the singular form. This tendency is still present in ninth grade, with respectively 88% versus
35 68% correct spellings.
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51

52 *Grammatical persistent difficulties: silent graphemes and homophony once again*

53
54 Concerning grammatical persistent difficulties, four items with persistent errors are
55 the plural marks on an adjective (*verts-/vɛʀ/, microscopiques-/mikroskopik/, perfectionnées-*
56
57
58
59
60

1
2
3 /pɛʁfɛksjɔne/, *bariolés-/barjole/*; green, microscopic, sophisticated, multicolored), one is the
4 plural mark on a noun (*immeubles-/imæbl/*, buildings). It is important to remember that in
5 French, the plural mark “s” at the end of words is silent; thus the singular and plural forms of
6 most nouns and adjectives are homophones and heterographs. It seems that ninth graders
7 persistently missed this plural mark especially on adjectives. However, the grammatical class
8 of the items may not be the only pertinent variable. Indeed, one other variable could be
9 important: the distance from the item and the determiner providing the oral plural mark.
10 Indeed, three of the plural adjectives were placed far from the determiners. Moreover, the
11 only noun for which the plural mark is persistently missed (*immeubles*, buildings) is used
12 without a determiner and comes after the preposition *d’-/d/*, which does not provide any
13 clues. In this case, to add the correct plural mark one has to think about the meaning (never
14 a single building in a town).

15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33 Two other items with persistent errors are the feminine mark on an adjective
34 (*perfectionnées-/pɛʁfɛksjɔne/*, *peuplée-/pœple/*; sophisticated, populated). As for the plural
35 mark “s”, the feminine mark “e” at the end of words is not pronounced in these items. It is
36 noteworthy that the feminine mark seems to be the strongest persistent difficulty, missed by
37 nearly 50% of ninth graders.

38
39
40
41
42
43
44
45 Two other items that give rise to persistent errors are the plural of verbs ending in
46 “ent” (*brillant-/brij/*, *voient-/vwa/*; (they) shine, (they) see) with the same phonological form
47 as the singular (*brille-/brij/*, *voit-/vwa/*; (he) shines, (he) sees). The principal error was the
48 omission of the plural mark. The word *voient* has the characteristic of being a homophone of
49 several other French words. The diversity of the errors made on this particular item clearly
50 reflected this difficulty. The other frequent error on the item *brillant* is *brilles-/brij/* (a plural
51 mark is present but is not appropriate for verbs). This mistake could mean that some ninth
52
53
54
55
56
57
58
59
60

1
2
3 graders could still overgeneralize the “s” plural mark to verbs. It could also mean that some
4
5 ninth graders still have difficulties in distinguishing verbs from nouns or adjectives (Le Levier,
6
7 Brissaud, & Huard, 2018).
8
9

10
11 Two other items with persistent errors (*raconter*-/rakɔ̃te/, *informé*-/ɛ̃fɔ̃rme/; to tell,
12
13 informed) concerned the production of /e/ verb endings. 74.2% of ninth graders wrote the
14
15 infinitive ending “er” correctly in *je vais vous raconter*-/ʒəvɛvurakɔ̃te/ (I’m going to tell you).
16
17 The most frequent error was *je vais vous racontez*, where we can hypothesize that the
18
19 agreement was made with the unit *vous* situated just before the verb (the “ez” ending error
20
21 was almost absent for the other infinitive *ils vont regarder*-/ilvɔ̃rəgarde/ (They are going to
22
23 look at)). Seventy-two percent of ninth graders correctly wrote the past participle when it
24
25 contained no morphological marks (*informé*). The most frequent error was the infinitive
26
27 form *informer*.
28
29
30
31
32
33
34
35

36 Overall, the analysis of grammatical errors suggests that homophones represent
37
38 persistent orthographic difficulties for French ninth graders, as is the case for English spellers
39
40 (Bahr et al., 2012). Other frequent difficulties are more specific to French spelling and are
41
42 related to the almost systematic absence of pronunciation of the plural and feminine marks.
43
44
45
46
47

48 Discussion

49
50
51 The aim of this study was to document the development of lexical and grammatical
52
53 spelling skills of middle school pupils aged between 12 and 15, by means of a longitudinal
54
55 study, an approach unavailable until now.
56
57
58
59
60

1
2
3 Our first hypothesis was that there would be a significant and positive evolution of
4
5 the global spelling performance between the sixth and ninth grades. We found that pupils
6
7 made significant progress between the sixth and ninth grades; the global 8.9% improvement
8
9 in the success rate is comparable to that reported by Manesse and Cogis (2007), estimated
10
11 as around 10%. Our study showed an effect of gender on orthographic enhancement, a well-
12
13 established result in the literature in this field. More precisely, our longitudinal data allowed
14
15 us to establish that the general enhancement between grades is smaller for boys than for
16
17 girls and that the difference between lexical score and grammatical score is larger for boys.
18
19
20
21

22 Our study also provides a more accurate picture of individual progress. The overall
23
24 results for lexical spelling reveal that significant progress (11.9%) is made between the sixth
25
26 and ninth grade and that, contrary to our hypothesis, growth between sixth and ninth grade
27
28 is not significantly larger for the grammatical score than for the lexical one. In addition, the
29
30 correlation and regression analyses suggest that lexical and grammatical performances do
31
32 not evolve independently during secondary school attendance (second hypothesis) as was
33
34 shown by Morin et al. (2018) for younger pupils in third and fifth grade. Two almost
35
36 complementary explanations could accommodate this dependency. First, general cognitive
37
38 skills probably influence the entire orthographic performance enhancement. Second, a good
39
40 lexical orthographic knowledge could directly help the pupil to acquire a better grammatical
41
42 knowledge, or the converse could be true. Overall, the dependency between lexical and
43
44 grammatical performance suggests that lexical and grammatical knowledge are not acquired
45
46 independently. Consequently, grammatical orthographic acquisition cannot simply be
47
48 viewed as the command of grammatical rules learned totally independently of lexical
49
50 orthographic knowledge. The observation of dissociation profiles also suggests an
51
52 asymmetric relationship between lexical and grammatical skill acquisition. Children clearly
53
54
55
56
57
58
59
60

1
2
3 presenting a dissociation between lexical and grammatical skill in sixth grade have been
4
5 isolated (children above the 50th percentile for one skill (GRAM+ or LEX+), and below the 25th
6
7 percentile for the other (lex- or gram-)), and their performances were observed in ninth
8
9 grade. Like Morin et al. (2018), we found more LEX+ and gram- children in sixth grade (6.7%)
10
11 than lex- and GRAM+ children (2.6%). The spelling progress of the LEX+ gram- children is
12
13 more uncertain, and less homogeneous than that of the GRAM+ lex- children. It is as though
14
15 grammatical skills help more to overcome lexical difficulties than the reverse. In other
16
17 words, we found it more alarming to have a grammatical weakness than a lexical one in sixth
18
19 grade. When the weakness is only lexical, the grammatical skill could promote progress. This
20
21 observation suggests an asymmetrical relationship between grammatical skills and lexical
22
23 ones which cannot be explained either by models based upon the learning of rules or by
24
25 models based on memorization.
26
27
28
29
30
31
32
33
34

35 According to our third hypothesis, the difficulties remaining at the end of ninth grade
36
37 are in connection with the specificities of French spelling. The qualitative analysis of lexical
38
39 errors has brought at least two persistent difficulties to light: double letters and the acute
40
41 accent of the letter “e” in the middle of words (see also Manesse & Cogis, 2007). These
42
43 errors, observed from second grade up persist into later life, despite highly systematic and
44
45 explicit teaching (Fayol et al., 2013). Furthermore, we know that double letters are difficult
46
47 to memorize, even for adults (Pacton et al., 2014). This difficulty was also highlighted in a
48
49 survey conducted among teachers — almost one in two of them admitted finding **double**
50
51 **letters** difficult (groupe RO, 2012). The other persistent error in ninth grade relates to the
52
53 acute accent of the letter *e*, particularly in the middle of words; for example, in *précisément*
54
55 (precisely) and *perfectionné* (sophisticated), the difficulty for the latter is preventing oneself
56
57
58
59
60

1
2
3 from using accents in syllables ending in a consonant. The percentage of this type of error
4
5 increases in ninth grade. This result reflects that of Lucci and Millet (1994) who found that
6
7 the majority of spelling errors concerns diacritical marks. As an explanation for such a
8
9 number of errors, their hypothesis is that the accents are not subject to special vigilance in
10
11 current society, and that consequently students do not pay attention to them.
12
13
14

15 With regard to grammatical spelling, despite this being a cause of particular concern
16
17 in society a great deal of progress is being made between sixth and ninth grade for plural
18
19 marking, the main errors being omission of silent markings. These results are in line with
20
21 other studies underlining the difficulty faced by spellers because of homophony-
22
23 heterography phenomena (Bahr et al., 2012; Fayol & Jaffré, 2008, 2014; Jaffré & Fayol,
24
25 2006). Significant progress is observed for nominal and adjectival plural markings (from 64.8
26
27 to 88.6% for nouns and from 30.8 to 57.4% for adjectives), and also for verbal plurals. The
28
29 same cannot be said of the “e” feminine mark which seems to be the most persistent
30
31 mistake for nearly 50% of the ninth graders (see the two last words in the table given in
32
33 Appendix 3: 46.8% are missing the final “e” in *perfectionnées* (sophisticated) is and 54.4%
34
35 the final “e” in *peuplée* (populated)).
36
37
38
39
40
41
42

43 The results obtained counterbalance somewhat the developmental scenario of
44
45 Totereau et al. (1998). First, the “s” mark at the end of nouns is not systematically used in
46
47 sixth grade, contrary to the implications of their model. One possible explanation is that
48
49 plural nouns in the dictation are in all likelihood more difficult than the nominal items used
50
51 by Totereau et al.: *pupilles-/pypij/* (pupils) and *jumelles-/zymel/* (binoculars) are uncommon
52
53 nouns, referring to objects which are rarely handled or cannot be handled. Second, our
54
55 study highlights a specific difficulty regarding the plural of adjectives which continues in
56
57 ninth grade. This difficulty was already identified in sixth grade (Totereau, Brissaud, Reilhac,
58
59
60

1
2
3 & Bosse, 2013). It cannot be attributed to the length of words (since *verts* (green, plural) is
4 no better spelled than *microscopiques* (microscopic, plural)) or to the presence/absence of
5 an audible signal next to the adjective (*yeux-/jø/* (eyes) is clearly a plural (one eye is said *oeil-*
6 */œj/*) and then could serve as a signal for writing *verts*). Although pupils often refer to the
7 meaning of the phrase to find the plural, they find it easier to put the “s” on nouns, which
8 concretely refer to objects (“I put an “s” because there are several things”), than to put it on
9 the adjectives that qualify these objects (while there are several *immeubles* (buildings), it is
10 less obvious to pick up on the plural nature of the fact that they are *bariolé* (multicolored).
11 We could even hypothesize as to a “color adjective effect” here, given that the special
12 treatment of this type of adjective when taught in French schools, whereby the exceptions
13 are strongly highlighted, creating confusion as to overall adjective use. The agreement of
14 color adjectives is, moreover, one of the difficulties that one in three teachers admits
15 experiencing (Groupe RO, 2012). A “homophone effect” could also potentially be suspected
16 – however, pupils make very few errors in the word *vert* (green, singular; they do write *vert*,
17 as opposed to *vers* (toward) or *verre* (glass), the three of them been pronounced */vɛʀ/*).
18 Nonetheless, we could think that the pupils' reflex would be related to the issue of
19 homophony, studied thoroughly at school, to the detriment of their being able to detect
20 number agreement. The interviews conducted with 150 ninth grade pupils about their
21 spelling choices in the dictation allowed this hypothesis to be made (Le Levier, Brissaud, &
22 Huard, 2018).

23
24
25 In terms of the verbal plural, it was observed that speech has a significant effect on
26 agreement, with an appreciable difference depending whether or not the third-person plural
27 is different when spoken (from 47 to 68.5% vs. 70.3 to 87.6%). This effect, which can also be
28 seen in adults (Largy & Fayol, 2001), is still clear in ninth grade. The analysis of persistent
29
30

1
2
3 errors (other than the absence of the “nt” ending) again raises the homophone-heterograph
4
5 problem which is frequently seen in French when writing *voient-/vwa/* (they see), which are
6
7 all existing homophones (from the most frequent error: *voit, voie, vois*, these three cover
8
9 about 80% of errors, see Appendix 4).
10
11

12
13 With respect to verb forms ending in /e/, our study confirms that pupils know how to
14
15 choose between “é” and “er” (Brissaud & Chevrot, 2011 ; Mout & Brissaud, 2013). It is,
16
17 however, easier to write a form ending in “er” in sixth grade than a form ending in “é”
18
19 (*informer* 62.7% vs. *perfectionnées* about 20%). In ninth grade, pupils manage more or less
20
21 equally well to spell the two target items in more complex syntactical contexts (“er” in *ils*
22
23 *vont regarder* (they are going to look at): 77.2%; “er” in *je vais vous raconter* (I am going to
24
25 tell you): 74.2%; “é” in *il l’a toujours considéré* (he always viewed him): 78%; “é” in *personne*
26
27 *n’est informé* (nobody is informed): 71.8%). When the target item is not “é” but “és” or
28
29 “ées”, choosing the following morphographs is a difficult issue for pupils. The accumulation
30
31 of marks on the past participle form (“é” + feminine + plural) still constitutes a difficulty in
32
33 ninth grade. Overall, the feminine mark appears to be dealt with less well than the plural
34
35 mark (Cogis & Brissaud, 2019). Our study confirms that the polyfunctionality of graphemes
36
37 and the homophonic-heterographic features that are characteristic of the French writing
38
39 system require an explicit teaching method throughout middle school. That said, progress
40
41 recorded in this study assuages the alarmist environment surrounding falling standards in
42
43 spelling.
44
45
46
47
48
49
50

51 52 **Limitations of the study**

53
54
55 Some methodological choices of the present study need to be discussed. The text
56
57 was dictated slowly. Every sentence was read at least three times and each segment was
58
59 repeated slowly at least twice to give the pupils enough time to write and think about their
60

1
2
3 spelling. However, students were not allocated time to re-read their text. This method
4
5 probably has the advantage of approaching pupils' automated knowledge and of avoiding
6
7 the influence of re-reading strategies, which can vary considerably from one student to
8
9 another. Nevertheless, this method might be considered as a limitation of the study because
10
11 it differs from the everyday classroom situation, where most of the time students have time
12
13 to re-read their written productions. Future studies might well use the first text as well as a
14
15 second, revised production, to obtain a finer measurement of how orthographic knowledge
16
17 is used by pupils.
18
19
20
21
22

23 A second limitation is that spelling is assessed with a text selected by researchers.
24
25 Instead, students could be invited to write their own texts about a simple and well-targeted
26
27 instruction. In such a case, words would be freely chosen by the participants, and it could be
28
29 hard to test advanced hypotheses. Thus the choice of a dictation appears to be a good
30
31 compromise to assess secondary students' spelling. These methodological choices raise the
32
33 more general question of what is a good measure of orthographic knowledge. In many
34
35 studies, participants are asked to write either words or isolated sentences. But the
36
37 management of spelling could seem quite different – and more demanding - in a text. If the
38
39 aim of learning to spell is to write correct texts, then spelling should be assessed in the
40
41 context of texts.
42
43
44
45
46
47

48 **Teaching suggestions**

49

50
51 The structure of French spelling itself seems to be a major source of difficulties, with
52
53 its numerous cases of homophonic words spelt in different ways, especially in the
54
55 grammatical field, which is socially overemphasized. As Bowers and Bowers (2018) said for
56
57 English, the French writing system is morphophonemic, not just alphabetic. Indeed, mastery
58
59
60

1
2
3 of the phonographic dimension is not enough to write French properly. Taking into account
4
5 the morphology of the words makes the French written system much more transparent
6
7
8 (Peereman & Sprenger-Charolles, 2018). Pending an ambitious reform of French spelling, it
9
10 seems necessary that teachers should be conscious of this particularity, to be able to
11
12 effectively help those for whom orthography is not easily set up.
13
14

15 Thus, the morphological principle, an important organizing principle of the French
16
17 writing system, should be valued and worked on in school. Indeed, the early ability to use
18
19 morphemes in reading and spelling has been found to be a good predictor of later literacy
20
21 skills (Nunes, Bryant, & Barros, 2012) and the relation between morphological awareness
22
23 and spelling ability has been demonstrated in French (Casalis, Deacon, & Pacton, 2011) as in
24
25 other languages (e.g., in Dutch: Rispens, McBride-Chang, & Reitsma, 2008; in Chinese: Tong,
26
27 McBride-Chang, Shu, & Wong, 2009). However, there is a debate regarding the age at which
28
29 the impact of morphological awareness on spelling become evident. In English, a clear
30
31 relation between morphological awareness and literacy acquisition is especially evident only
32
33 in the later grades of primary school (Castles, Rastle, & Nation, 2018) and it has been
34
35 suggested that it is because in the first grades, children are essentially exposed to short
36
37 monomorphemic words. In French, too few studies have explored this issue but we can
38
39 hypothesize that morphological awareness could be useful earlier, especially for spelling.
40
41
42 Indeed, even short frequent French words often contain silent letters which are
43
44 morphological marks.
45
46
47
48
49
50

51
52 Our results led us to recommend the maintenance of a more explicit instructional
53
54 style in sixth and ninth grade when teaching homophones and heterographs. The
55
56 accumulation of marks, for instance on the past participle form (e.g., the three marks: “é” +
57
58 feminine “e” + plural “s” in *perfectionnées, sophisticated*) requires several stages of
59
60

1
2
3 reasoning which are difficult to build together even though the pupils know how to solve
4
5 them separately. Teaching the identification of grammatical marks, their condition of use,
6
7 and their distribution in sentences, appears to be necessary, especially if we consider the link
8
9 between an explicit strategy for grammar and the teaching of writing (Myhill, Jones, Lines &
10
11 Watson, 2012; Brissaud & Fayol, 2018). This is true not only for French, but also for many
12
13 languages with a writing system faced with homophonic words or endings spelt in a different
14
15 way, depending on the grammatical status. In Greek, morphological knowledge is needed to
16
17 spell inflectional morphemes (Nunes, Aidinis, & Bryant, 2006). Furthermore, Dutch has verb
18
19 spellings that are grammatically determined (Bosman, de Graaff, & Gijssel, 2006), and English
20
21 has a major apostrophe problem (Bryant, Devine, Ledward, & Nunes, 2002).
22
23
24
25
26
27

28 A more explicit instruction is particularly needed for the learning of the “e” feminine
29
30 mark. Our data confirmed that it is not over at the end of middle school (Brissaud, 2015).
31
32 The agreement of the adjective, in spite of all the lessons of grammar or spelling, remains
33
34 rather opaque for students at the end of ninth grade. Yet, without identification of the
35
36 lexical item in context, this remains difficult. Teachers should help pupils use the formal
37
38 designation of parts of speech (adjectives, nouns, verbs, etc.) when they try to solve
39
40 agreement problems (Nadeau & Fisher, 2014).
41
42
43
44

45 The production of all these silent marks, which often requires a grammatical
46
47 reasoning, is all the more difficult in text writing, when attention is monopolized by the
48
49 multiple aspects of text production. Another teaching suggestion is not to confine oneself to
50
51 proposing exercises that allow students to automate agreement. Teachers could
52
53 systematically ask students to write short texts during grammar lessons including the marks
54
55 learned or revised, so that students can gradually practice spelling in writing and learn how
56
57 to control the presence of socially valued grammatical marks.
58
59
60

1
2
3 These results also suggest that speech should be taken as a basis on which to work,
4
5 firstly on audible agreement marks (*vivent, agrandissent*), and then on plural marks where
6
7 no change from the singular can be heard when pronounced (*brillant*). This idea challenges
8
9 the traditional order in which French conjugation is taught and certain ideas received, for
10
11 example the assumption that third group verbs are more difficult to learn than first group
12
13 verbs. However, most third group verbs distinguish the third-person singular from the third-
14
15 person plural (*boit/boivent* pronounced /bwa/ vs. /bwav/). Two common third group verbs –
16
17 *voir* (to see) and *croire* (to believe) – are exceptions to this rule. Their plurals do not differ
18
19 audibly: *voit* and *voient* (third-person singular and plural, respectively, of *voir*) are
20
21 pronounced in the same way (/vwa/), just like *croit* and *croient* (third-person singular and
22
23 plural of *croire*, both pronounced /krwa/), which most likely explains generalization errors
24
25 like "ils croivent" pronounced /krwav/ (instead of *ils croient*) and "ils voyent" pronounced
26
27 /vwaj/ (instead of *ils voient*). Particular attention should be given in middle school to these
28
29 two very commonly used verbs.
30
31
32
33
34
35
36
37
38
39
40
41

42 To conclude, our study shows that secondary school is a place of progress regarding
43
44 both lexical and grammatical spelling. Moreover, the longitudinal study shows that these
45
46 two skills go on interacting with each other during secondary school education.
47
48 Furthermore, it highlights the complexity of the knowledge and skills used when spelling
49
50 French. Finally, the present study suggests the importance of detecting students with a
51
52 grammatical weakness at the beginning of secondary school attendance and continuing to
53
54 work on spelling in connection with text production after Grade 9.
55
56
57
58
59
60

Acknowledgments

The authors would like to thank Guy Cherqui, head of the academic group for the prevention of illiteracy, the headmasters of the secondary schools, their staff and the children who participated in the study, for their commitment to the organization of the assessments. This research was funded by a grant from the University Grenoble Alpes (ORTHOCOL, AGIR-POLE 2015 edition) and by the ANR-12-BSH2-0013 ORTHOLEARN project, funded by the ANR (French National Research Agency).

1
2
3 Notes
4
5
6
7
8

9 i "é" and "ai" tend to be pronounced in the same way (/e/) in a large part of the French-speaking
10 world, further to the neutralization of the two different vowels (closed /e/ and open /ɛ/) in a rich and
11 uneconomic vowel system.
12
13

14
15 ii In fact, there are ten. The last one is *trouvai* (past tense, 1st person, I found), not used in spoken
16 French, but still occasionally used at school when writing stories, although the 3rd and 6th persons are more
17 frequently used. A recent study reveals that the absence of neutralization (i.e., a distinct pronunciation for the
18 imperfect tense and the past participle) does not necessarily guarantee the correct selection of verb endings
19 (Brissaud, Negro, & Fisher, 2012).
20
21
22

23
24
25 iii This test has been designed by Michel Zorman and collaborators. It can be downloaded on
26 www.cognisciences.com
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

References

- Alamargot, D., Flouret, L., Larocque, D., Caporossi, G., Pontart, V., Paduraru, C.,
Morrisset, P., & Fayol, M. (2015). Successful written subject verb agreement: an online
analysis of the procedure used by students in Grades 3, 5 and 12. *Reading and Writing*. 28
(3), 291 - 312. <https://doi.org/10.1007/s11145-014-9525-0>
- Allal, L. (1997). Acquisition de l'orthographe en situation de classe. In L. Rieben, M.
Fayol, & C. A. Perfetti (Ed.), *Des orthographe et leur acquisition* (pp. 181-203). Delachaux et
Niestlé.
- Andreu, S., & Steinmetz, C., MEN-DEPP, (2016). Les performances en orthographe des
élèves en fin d'école primaire (1987-2007-2015). *Note d'information n° 28*, Novembre 2016.
- Bahr, R.H., Silliman, E.R., Berninger, V.W., & Dow, M. (2012) Linguistic Pattern
Analysis of Misspellings of Typically Developing Writers in Grades 1 to 9. *Journal of Speech,
Language, and Hearing Research*, Vol. 55, 1587-1599. [https://doi.org/10.1044/1092-4388\(2012/10-0335\)](https://doi.org/10.1044/1092-4388(2012/10-0335))
- Berninger, V.W. (1994) *The Varieties of Orthographic Knowledge I: Theoretical and
Developmental Issues*. Springer Netherlands.
- Berninger, V. W., Nielsen, K. H., Abbott, R. D., Wijsman, E., & Raskind, W. (2008).
Gender differences in severity of writing and reading disabilities. *Journal of School
Psychology*, 46(2), 151-172. <https://doi.org/10.1016/j.jsp.2007.02.007>
- Bosman, A. M., de Graaff, S., & Gijssels, M. A. (2006). Double Dutch: The Dutch spelling
system and learning to spell in Dutch. In R. M. Joshi & P. G. Aaron (Eds.) *Handbook of
orthography and literacy* (pp. 135-150). Lawrence Erlbaum Associates, Publishers.

1
2
3 Bosse, M.-L., Chaves, N., Largy, P., & Valdois, S. (2015). Orthographic learning during
4 reading: The role of whole-word visual processing. *Journal of Research in Reading*, 38, 141–
5
6 158. <https://doi.org/10.1111/j.1467-9817.2012.01551.x>
7
8

9
10 Bowers, J. S., & Bowers, P. N. (2018). Progress in reading instruction requires a better
11 understanding of the English spelling system. *Current Directions in Psychological Science*,
12 27(6), 407-412. <https://doi.org/10.1177/0963721418773749>
13
14
15

16
17
18 Brissaud, C. (2015). Du décalage entre prescription et acquisition des élèves en fin de
19 scolarité obligatoire en France : quels enseignements tirer de 98 dictées de 3^e ? *Le Français*
20 *aujourd'hui*, 190, 61-70.
21
22

23
24
25 Brissaud, C., & Chevrot, J.-P. (2011). The late acquisition of a major difficulty of
26 French inflectional orthography: the homophonic /E/ verbal endings, *Writing Systems*
27 *Research*, 3, n°2: 129-144. <https://doi.org/10.1093/wsr/wsr003>
28
29

30
31
32 Brissaud, C., & Fayol, M. (2018). *Etude de la langue et production d'écrits*. Rapport
33 scientifique, conférence de consensus *Ecrire et rédiger*, CNESCO. [http://www.cnesco.fr/wp-](http://www.cnesco.fr/wp-content/uploads/2018/04/VDEF-rapport-Brissaud-Fayol.pdf)
34 [content/uploads/2018/04/VDEF-rapport-Brissaud-Fayol.pdf](http://www.cnesco.fr/wp-content/uploads/2018/04/VDEF-rapport-Brissaud-Fayol.pdf)
35
36
37

38
39
40 Brissaud, C., Negro, I., & Fisher, C. (2012). The relation between spelling and
41 pronunciation: the case of French /E/ verbal endings, *Written Language and Literacy*, 15.1.,
42 46-64. <https://doi.org/10.1075/wll.15.1.03bri>
43
44
45

46
47 Bryant, P., Devine, M., Ledward, A., & Nunes, T. (2002). Spelling with apostrophes
48 and understanding possession, *British Journal of Educational Psychology*, 67, 91-110.
49
50 <https://doi.org/10.1111/j.2044-8279.1997.tb01229.x>
51
52

53
54 Bryant, P., Deacon, H., & Nunes, T. (2006). Morphology and spelling: What have
55 morphemes to do with spelling? In R. M. Joshi & P. G. Aaron (Ed.) *Handbook of orthography*
56 *and literacy* (pp. 601-616). Lawrence Erlbaum Associates, Publishers.
57
58
59
60

1
2
3 Carlisle, J. F. (2010). Review of Nunes, T., and Bryant, P. (2006). Improving literacy by
4 teaching morphemes. Routledge. *Reading and Writing*, 23, 257–262.

5
6
7
8 <https://doi.org/10.1007/s11145-008-9151-9>
9

10 Casalis, S., Deacon, S. H., & Pacton, S. (2011). How specific is the connection between
11 morphological awareness and spelling? A study of French children. *Applied Psycholinguistics*,
12 32(3), 499-511. <https://doi.org/10.1017/S014271641100018X>
13
14
15
16
17

18 Castles, A., Rastle, K., & Nation, K. (2018). Ending the reading wars: Reading
19 acquisition from novice to expert. *Psychological Science in the Public Interest*, 19, 5–51.
20
21
22 <https://doi.org/10.1177/1529100618772271>
23
24
25

26 Catach, N. (dir.) (1995). *Dictionnaire historique de l'orthographe française*. Larousse.

27
28 Chervel, A., & Manesse D. (1989). *La dictée, les Français et l'orthographe. 1873-1987*.
29 Calmann-Levy/INRP.
30
31

32
33 Cazal, Y., & Parussa, G. (2015). *Introduction à l'histoire de l'orthographe*. Armand
34
35
36 Colin.

37
38 Cogis, D., & Brissaud, C. (2019). À la poursuite des marques de genre... In C.
39
40 Mortamet, C. (dir.) *L'orthographe : pratiques d'élèves, pratiques d'enseignants,*
41
42 *représentations* (pp. 43-71). Presses universitaires de Rouen.
43
44

45
46 Coulmas, F. (2003). *Writing Systems. An introduction to their linguistic analysis*.
47
48 Cambridge University Press, UK.
49

50
51 Cousin, M.P., Largy, P., & Fayol, M. (2002). Sometimes early learned instances
52
53 interfere with the implementation of rules: The case of nominal number agreement. *Current*
54
55 *Psychology Letters: Behavior, Brain & Cognition*, 2-8, 51-65
56
57
58
59
60

1
2
3 Daffern, T. (2017). Linguistic skills involved in learning to spell: An Australian study.
4
5 *Language and Education*, 31(1), 307-329. <https://doi.org/10.1080/09500782.2017.1296855>
6
7

8 Daffern, T., Mackenzie, N. M, & Hemmings, B. (2017). Predictors of writing success:
9
10 How important are spelling, grammar and punctuation? *The Australian Journal of Education*,
11
12 61(1), 75-87. <https://doi.org/10.1177/0004944116685319>
13
14

15 Deacon, S. H., & Leung, D. (2013). Testing the statistical learning of spelling patterns
16
17 by manipulating semantic and orthographic frequency. *Applied Psycholinguistics*, 34(06),
18
19 1093-1108. <https://doi.org/10.1017/S0142716412000173>
20
21

22 Fayol, M., Grimaud, F., & Jacquier, M. (2013). Une expérience d'enseignement
23
24 explicite de l'orthographe lexicale. *Approche Neuropsychologique des Apprentissages chez*
25
26 *l'Enfant*, 31, 22-29.
27
28

29
30 Fayol, M., Hupet, M., & Largy, P. (1999). The acquisition of subject-verb agreement in
31
32 written French: From novices to experts' errors. *Reading and Writing*, 11(2), 153-174.
33
34 <https://doi.org/10.1023/A:1008038127807>
35
36

37
38 Fayol M., & Jaffré J.-P. (2008). *Orthographier*. Presses universitaires de France.
39

40
41 Fayol, M., & Jaffré, J.-P. (2014). *L'orthographe*. Presses universitaires de France.
42

43
44 Fisher, C., & Nadeau, M. (2014). Usage du métalangage et des manipulations
45
46 syntaxiques au cours de dictées innovantes dans des classes du primaire, *Repères* [En ligne],
47
48 49, 169-191. <https://doi.org/10.4000/reperes.742>
49

50
51 French Ministry of Education (2019). Bulletin officiel spécial n°1 du 22 janvier 2019,
52
53 Annexe 1, Programme de français de seconde générale et technologique.
54
55 [https://cache.media.education.gouv.fr/file/SP1-MEN-22-1-](https://cache.media.education.gouv.fr/file/SP1-MEN-22-1-2019/92/8/spe575_annexe1_1062928.pdf)
56
57 [2019/92/8/spe575_annexe1_1062928.pdf](https://cache.media.education.gouv.fr/file/SP1-MEN-22-1-2019/92/8/spe575_annexe1_1062928.pdf)
58
59
60

1
2
3 Groupe RO (2012). Orthographe : ce qui est jugé difficile. L'avis d'enseignants et de
4
5 futurs enseignants. *Glottopol*, 19.

6
7
8 http://glottopol.univ-rouen.fr/telecharger/numero_19/gpl19_02_ROb.pdf
9

10 Jaffré, J.-P., & Brissaud, C. (2006). Homophonie et hétérographie : un point nodal de
11
12 l'orthographe. In R. Honvault-Ducrocq (dir.), *L'orthographe en questions* (pp. 145-168).
13
14 Publications des universités de Rouen et du Havre, collection *Dyalang*.
15

16
17 Jaffré, J.-P., & Fayol, M. (2006). Orthography and literacy in French. In R. M. Joshi & P.
18
19 G. Aaron (Eds.) *Handbook of orthography and literacy* (pp. 81-104). Lawrence Erlbaum
20
21 Associates, Publishers.
22

23
24 Katusic, S. K., Barbaresi, W. J., Colligan, R. C., Bagniewski, S. M., & Weaver, A. L.
25
26 (2006). Written language learning disorder: Incidence in a population-based birth cohort,
27
28 1976-1982, Rochester, Minnesota. *Journal of Developmental & Behavioral Pediatrics*, 27(5),
29
30 439-440.
31
32

33
34
35 Lanoë, C., Lubin, A., Houdé, O., Borst, G., & De Neys, W. (2017). Grammatical
36
37 attraction error detection in children and adolescents. *Cognitive Development*, 44, 127-138.
38

39
40 <https://doi.org/10.1016/j.cogdev.2017.09.002>
41

42 Largy, P., & Fayol, M. (2001). Oral cues improve subject-verb agreement in written
43
44 french. *International Journal of Psychology*, 36 (2), pp. 121-132.
45

46
47 <https://doi.org/10.1080/00207590143000009>
48

49 Largy, P., Fayol, M., & Lemaire, P. (1996). The homophone effect in written French:
50
51 The case of verb-noun inflection errors. *Language and Cognitive Processes*, 11, 217-255.
52
53

54
55 <https://doi.org/10.1080/016909696387178>
56
57
58
59
60

1
2
3 Lehtonen, A., & Bryant, P. (2005). Active players or just passive bystanders? The role
4 of morphemes in spelling development in a transparent orthography. *Applied*
5
6 *psycholinguistics*, 26(02), 137-155. <https://doi.org/10.1017/S0142716405050113>
7
8

9
10 Le Levier, H., Brissaud, C., & Huard, C. (2018). Le raisonnement orthographique chez des
11 élèves de troisième : analyse d'un corpus d'entretiens métagraphiques. *Pratiques*, 77-78.
12
13 <https://doi.org/10.4000/pratiques.4464>
14
15

16
17
18 Lucci, V., & Millet, A. (1994) L'orthographe de tous les jours. *Enquête sur les pratiques*
19 *orthographiques des Français*. Champion.
20
21

22
23 Manesse D. & Cogis D. (2007). *Orthographe – à qui la faute ?* ESF Editeur.
24

25
26 Martinet, A. (1979). *Grammaire fonctionnelle du français*. Didier-Crédif.
27

28
29 Morin, M.-F, Alamargot, D., Diallo T. M.O. & Fayol M. (2018). Individual differences in
30 lexical and grammar spelling across primary school, *Learning and Individual Differences*,
31
32 Volume 62, 2018, p. 128-140. <https://doi.org/10.1016/j.lindif.2018.02.002>
33
34

35
36 Mout, T. & Brissaud, C. (2013). Acquisition de la morphographie flexionnelle du
37 français : retard de jeunes adultes en formation professionnelle, *Journal of French Language*
38 *Studies*, vol. 23-3, 435-449. <https://doi.org/10.1017/S0959269511000512>
39
40

41
42 Myhill, D. A. Jones, S.M., Lines H., & Watson, A. (2012): Rethinking grammar: the
43 impact of embedded grammar teaching on students' writing and students' metalinguistic
44 understanding, *Research Papers in Education*, 27:2, 139-166.
45
46

47
48 <https://doi.org/10.1080/02671522.2011.637640>
49

50
51
52 Nadeau, M., & Fisher, C. (2009). Faut-il des connaissances explicites en grammaire
53 pour réussir les accords en français écrit ? Résultats d'élèves de 6^e année du primaire. In J.
54 Dolz et C. Simard (Eds.), *Pratiques d'enseignement grammatical. Points de vue de*
55
56 *l'enseignant et de l'élève* (pp. 209-229). Les presses de l'Université Laval.
57
58
59
60

1
2
3 New, B., Pallier, C., Brysbaert, M., & Ferrand, L. (2004) Lexique 2: A New French
4 Lexical Database. *Behavior Research Methods, Instruments, & Computers*, 36 (3), 516-524.
5
6
7
8 <https://doi.org/10.3758/BF03195598>
9

10 Nunes, T., Aidinis, A., & Bryant, P. (2006). The acquisition of Written Morphology in
11 Greek. In R. M. Joshi & P. G. Aaron (Eds.) *Handbook of orthography and literacy* (pp. 201-
12 218). Lawrence Erlbaum Associates, Publishers.
13
14
15

16
17
18 Nunes, T., & Bryant, P. (2006). *Improving literacy by teaching morphemes*. Routledge.
19

20
21 Nunes, T., Bryant, P., & Barros, R. (2012). The development of word recognition and
22 its significance for later reading skills. *Journal of Educational Psychology*, 104, 959-973.
23
24
25
26 <https://doi.org/10.1037/a0027412>
27

28
29 Pacton, S., Borchardt, G., Treiman, R., Lété, B., & Fayol, M. (2014). Learning to spell
30 from reading: General knowledge about spelling patterns influences memory for specific
31 words. *The Quarterly Journal of Experimental Psychology*, 67(5), 1019-1036.
32
33
34
35
36 <https://doi.org/10.1080%2F17470218.2013.846392>
37

38
39 Peereman, R., Lété, B., & Sprenger-Charolles, L. (2007). Manulex-infra: Distributional
40 characteristics of grapheme—phoneme mappings, and infralexical and lexical units in child-
41 directed written material. *Behavior Research Methods*, 39(3), 579-589.
42
43
44
45
46 <https://doi.org/10.3758/BF03193029>
47

48
49 Peereman, R., & Sprenger-Charolles, L. (2018). Manulex-MorphO, une base de
50 données sur l'orthographe du français intégrant les morpho-phonogrammes. *Langue*
51 française, (3), 99-109. <https://doi.org/10.3917/lf.199.0099>
52
53
54
55
56
57
58
59
60

1
2
3 Pellat, J.-C., & Andrieux-Reix, N. (2006). Histoire d'É ou de la variation des usages
4 graphiques à la différenciation réglée. *Langue française*, 3/2006, 151, 7-24.

5
6
7
8 <https://doi.org/10.3917/lf.151.0003>
9

10
11 Pothier, B. & Pothier, P. (2003). *Eole : Echelle d'acquisition en orthographe lexicale*.
12
13 Retz.
14

15
16 Rastle, K. (2019). The place of morphology in learning to read in English. *Cortex*, 116,
17
18 45-54. <https://doi.org/10.1016/j.cortex.2018.02.008>
19

20
21 Rispens, J.E., McBride-Chang, C. & Reitsma, P. (2008). Morphological awareness and
22
23 early and advanced word recognition and spelling in Dutch. *Reading and Writing*, 21, 587–
24
25 607. <https://doi.org/10.1007/s11145-007-9077-7>
26
27

28
29 Share, D. L. (1995). Phonological recoding and self-teaching: Sine qua non of reading
30
31 acquisition. *Cognition*, 55(2), 151-218. [https://doi.org/10.1016/0010-0277\(94\)00645-2](https://doi.org/10.1016/0010-0277(94)00645-2)
32
33

34
35 Sprenger-Charolles, L., Siegel, L. S., Béchennec, D., & Serniclaes, W. (2003).
36
37 Development of phonological and orthographic processing in reading aloud, in silent
38
39 reading, and in spelling: A four-year longitudinal study. *Journal of Experimental Child*
40
41 *Psychology*, 84(3), 194-217. [https://doi.org/10.1016/S0022-0965\(03\)00024-9](https://doi.org/10.1016/S0022-0965(03)00024-9)
42
43
44

45
46 Team, R. C. (2018). R: A language and environment for statistical computing. R
47
48 Foundation for Statistical Computing, Vienna, Austria. <http://www.R-project.org>
49

50
51 Tong, X., McBride-Chang, C., Shu, H., & Wong, A. M. (2009). Morphological
52
53 awareness, orthographic knowledge, and spelling errors: Keys to understanding early
54
55 Chinese literacy acquisition. *Scientific Studies of Reading*, 13(5), 426-452.
56
57
58 <https://doi.org/10.1080/10888430903162910>
59
60

1
2
3 Totereau, C., Brissaud, C., Reilhac, C., & Bosse, M.-L. (2013). L'orthographe
4 grammaticale au collège : une approche sociodifférenciée. *ANAE*, 123, 164-171.
5
6
7

8 Totereau, C., Fayol, M., & Barrouillet, P. (1998). Overgeneralizations of number
9 inflections in the learning of written French: the case of noun and verb. *British Journal of*
10 *Developmental Psychology*, 16 (4), 447-464. <https://doi.org/10.1111/j.2044->
11 [835X.1998.tb00764.x](https://doi.org/10.1111/j.2044-835X.1998.tb00764.x)
12
13
14
15
16
17

18 Treiman, R., & Cassar, M. (1996). Effects of morphology on children's spelling of final
19 consonant clusters. *Journal of experimental child psychology*, 63(1), 141-170.
20
21 <https://doi.org/10.1006/jecp.1996.0045>
22
23
24
25

26 Van Reybroeck, M., & Hupet, M. (2012). L'acquisition de l'orthographe grammaticale
27 : cadres théoriques généraux. *A.N.A.E.*, 116, 47-53.
28
29
30

31 Véronis, J. (1988). From sound to spelling in French: Simulation on a computer.
32 *Cahiers de Psychologie Cognitive*, 8 (4), 315-334.
33
34
35

36 Walter, H. (2001). *Honni soit qui mal y pense. L'incroyable histoire d'amour entre le*
37 *français et l'anglais*. Robert Laffont.
38
39
40

41
42 Ziegler, J. C., Jacobs, A. M., & Stone, G. O. (1996). Statistical analysis of the
43 bidirectional inconsistency of spelling and sound in French. *Behavior Research Methods,*
44 *Instruments, & Computers*, 28(4), 504-515. <https://doi.org/10.3758/BF03200539>
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

ANNEXE 1: Text details

Original ROC test dictation.

Je vais vous raconter l'histoire d'un gentil petit garçon qui s'appelle Jo. Il habite chez son oncle, un vieux monsieur qui vit dans un bourg. Cet enfant possède un don extraordinaire. En effet, grâce à ses yeux verts, il voit beaucoup plus loin et précisément que tout le monde ! Dans ses pupilles se trouvent des jumelles intégrées, microscopiques et invisibles.

6th/9th grade common dictation. The 22 items of the lexical score are underlined, the 13 items of the grammatical score are in bold. Segmentation for dictation (see procedure) is represented by /

Je vais vous raconter l'histoire / d'un gentil petit garçon / qui s'appelle Jo. Il habite chez son oncle, / un vieux monsieur. / Ils **vivent** dans une cité. / Cet enfant possède un don extraordinaire. / En effet, / ses yeux verts / **voient** beaucoup plus loin / et plus précisément / que **ceux** de tout le monde ! / Dans ses pupilles / qui s'**agrandissent** et qui **brillent**, / on devine / des jumelles microscopiques perfectionnées. (I am going to tell you the story / of a kind little boy / called Jo. / He lives at his uncle's, / an old gentleman. / They live in a city. / This child has an extraordinary gift. / Indeed, / his green eyes / can see much further / and better than anybody's! / In his pupils / which get bigger and light up, / you can make out / sophisticated microscopic binoculars.)

1
2
3 **Additional 9th grade dictation** (11 additional lexical items and 9 additional
4 grammatical items)
5
6

7
8 Dans la ville peuplée d'immeubles bariolés, / personne n'est informé de ce don, /
9 sauf son oncle, qui l'a toujours considéré comme son fils. / Alors, souvent, Jo et le vieil
10 homme vont regarder ensemble par la fenêtre / et Jo décrit ce qu'il voit.
11
12
13
14

15
16 (In the city full of multicolored buildings, / nobody is informed of this gift, / except his
17 uncle, who has always thought of him as his son. / Jo and the old man often go and look out
18 the window together / and Jo describes what he can see.)
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

ANNEXE 2: Lexical items ranked by the score at 9th grade : read and spoken

frequencies (expressed as millions of occurrences, Lexique 3, www.lexique.org: New, Pallier, Brysbaert, & Ferrand, 2004), phoneme-to-grapheme consistencies (Manulex-infra: Peereman, Lété, & Sprenger-Charolles, 2007), theoretical percent of correct spelling at grade 5 according to the EOLE scale (Pothier & Pothier, 2003), percentages of correct spelling obtained at grades 6 and 9; in bold, 9th grade percentages lower than 75%.

dictation	item	Reading Frequency (lexique.org)	Spoken Frequency (lexique.org)	P-G consistency (Manulex- infra)	% correct grade 5 (EOLE)	Mean score (%) at 6 th grade	Mean score (%) at 9 th grade
9th	ville	311.69	277.98	76.52	98		99.4
6th-9th	oncle	121.96	124.11	84.34	79	96.6	99.2
6th-9th	petit	653.78	573.72	82.36	100	97.2	98.6
9th	homme	852.23	781.11	61.86	100		98.2
6th-9th	monde	732.43	823.62	77.58	97	93.1	97.8
6th-9th	enfant	381.96	287.26	59.24	100	96.2	97.8
6th-9th	yeux	955.68	315.89	67.38	85	92.2	97.6
9th	fils	247.64	480.15	71.07	100		97.4
6th-9th	vert	59.12	24.74	70.59	100	51.6	97.2
6th-9th	beaucoup	461.42	626	54.07	97	89.7	96.8
6th-9th	histoire	292.23	295.32	77.94	97	88.5	96.6
9th	souvent	286.96	135.54	68.45	97		96.4
9th	sauf	83.99	108.54	71.46	97		96
6th-9th	garçon	186.96	188.41	77.47	100	95.6	95.8
6th-9th	jumelle	1.96	0.72	63.17	94	87.7	94.4
6th-9th	microscopique	0.88	0.62	74.76	90	58.3	93.8

6th-9th	loin	452.36	248.34	100	90	87.1	92.1
6th-9th	monsieur	286.76	583.45	54.17	68	74.8	89.1
6th-9th	pupille	2.43	2.04	82.63		78.8	88.5
6th-9th	gentil	37.36	134.11	46.54	88	73.8	86.7
9th	fenêtre	199.39	70.2	80.29	70		86.5
9th	toujours	1093.78	1072.36	75.38	59		86.3
9th	personne	312.16	577.6	62.11	95		85.9
6th-9th	effet	173.18	99.17	42.64	57	61.5	85.9
9th	ensemble	145.07	253.47	68.61	86		84.7
6th-9th	extraordinaire	36.01	23.71	83.9	72	71.2	84.5
6th-9th	vieux	273.31	180.08	72.86	81	78.8	84.1
6th-9th	cit�	20.68	14.55	59.49	51	79.2	81.2
6th-9th	don	30.27	35.47	96.84	72	64.9	80.4
9th	immeuble	50.88	24.54	80.37	73		79
6th-9th	perfectionn�	1.62	5.61	62	70	39.1	73.4
6th-9th	pr�cis�ment	34.8	12.8	72.03	63	33.1	38.3
9th	vieil	51.22	34.69	87.32	45		37.3

ANNEXE 3: Grammatical items ranked by the score at 9th grade: mean scores in percentages; in bold, 9th grade percentages lower than 75% .

dictation	item	Item category	Mean score (%) at 6 th grade	Mean score (%) at 9 th grade
9th	est			94
6th-9th	vivent	Verb G1 plural present	77.6	91.1
6th-9th	jumelles	Plural noun	65.9	90.3
6th-9th	ils	Pronoun plural	64.1	88.9
9th	voit	Verb G3 sing present		87.1
6th-9th	pupilles	Plural noun	63.7	86.7
6th-9th	s'agrandissent	Verb G1 plural present	62.9	84.1
9th	considéré	Verb past particip		78
9th	regarder	Verb infinitif		77.2
9th	décrit	Verb G3 sing present		74.2
6th-9th	raconter	Verb infinitif	62.7	74.2
9th	informé	Verb past particip		71.8
6th-9th	voient	Verb G1 plural present	45	68.5
6th-9th	brillant	Verb G1 plural present	49	68.5
6th-9th	ceux		38.1	65.3
9th	bariolés	Plural adjective		59.1
6th-9th	verts	Plural adjective	43.1	58.9
6th-9th	perfectionnées	Plural adjective	26.8	58.5
9th	immeubles	Plural noun		55.8
6th-9th	microscopiques	Plural adjective	22.6	54.8
6th-9th	perfectionnées	Feminine adj.	19.6	53.2
9th	peuplée	Feminine adj.		45.6

Note: G1 = first group (verbs, infinitif form ending with "er"); G3 = third group (verbs)

ANNEXE 4: Persistent errors at grade 9

Lexical persistent errors on the 3 items showing more than 25% of errors at grade 9:

For each item, percentages of phonologically plausible and non-phonologically plausible errors on the total number of errors, and percentages of the most frequent errors, are given.

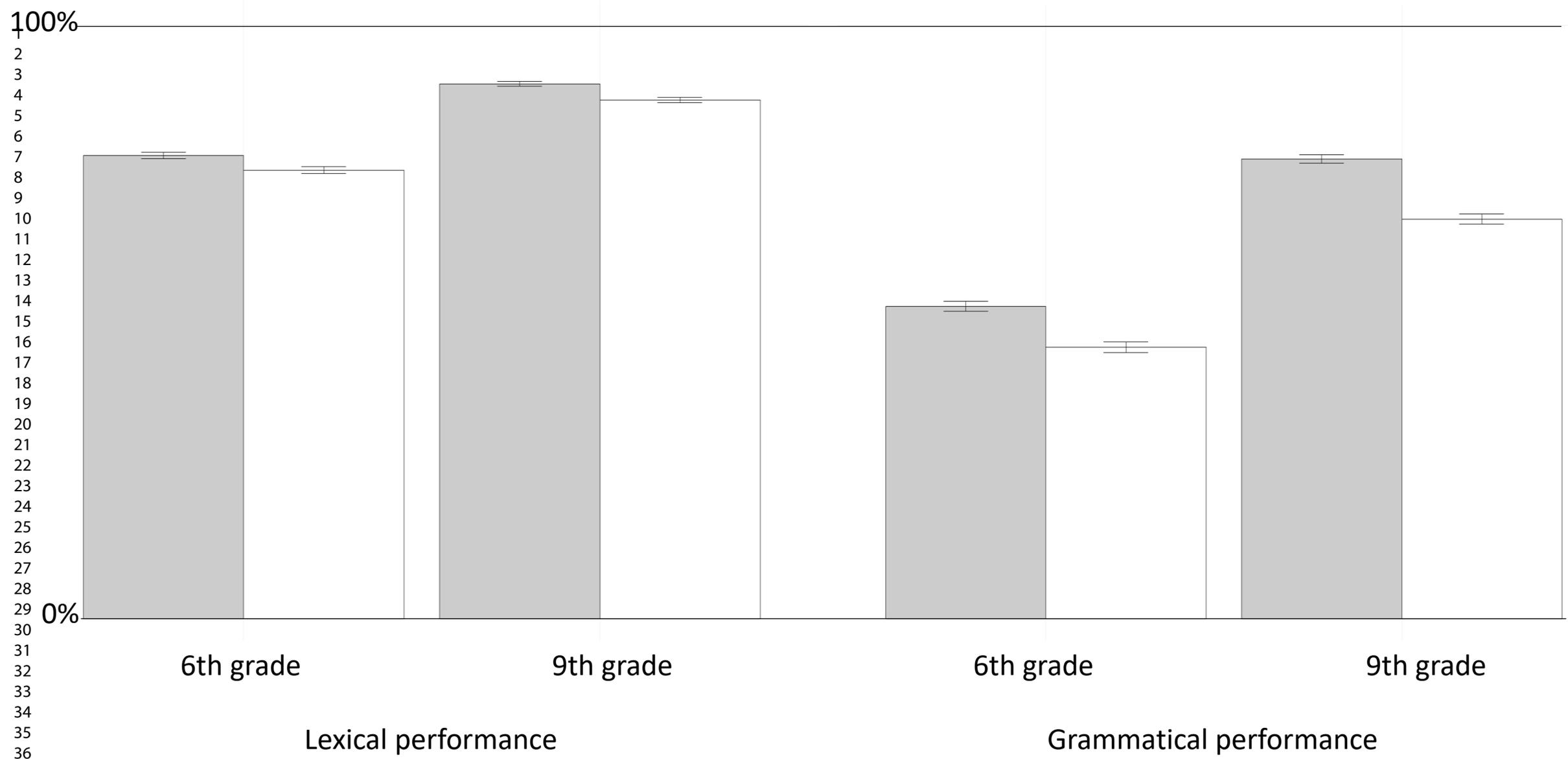
	précisément	perfectionn(é)	Vieil
Phonologically plausible errors			
TOTAL	14.4%	53.8%	38.6%
Most frequent	précisément: 7.2%	perfection(é): 40.2%	vielle: 38.6%
2 nd most frequent	préssisément: 1.6%	perfeciionn(é): 1.5%	
3 rd most frequent	précisément: 1.3%	perfexion(é): 1.5%	
Non-phonologically plausible errors			
TOTAL	85.6%	46.2%	61.4%
Most frequent	précisément: 42.2%	perféctionn(é): 22%	vielle: 29.3%
2 nd most frequent	precisement: 9.2%	pérféctionn(é): 2.3%	viel: 16.4%
3 rd most frequent	préssisément: 6.2%	pérféction(é): 1.5%	vielle: 5.1%

Grammatical persistent errors on the 10 items showing more than 25% of errors at grade 9:

For each item, classification and percentage of the most frequent errors

Item	Most frequent error classification		Other frequent errors
Voient	Singular form (voit)		voie: 27.1%; vois (16.8%)

		4.8	
brillant	Singular form (brille)	3.7	brilles: 20.5%
Verts	Plural mark (s) omission	00%	
microscopiques	Plural mark (s) omission	00%	
perfectionnées	Feminine mark (e) omission	00%	
perfectionnées	Plural mark (s) omission	00%	
peuplée	Feminine mark (e) omission	00%	
immeubles	Plural mark (s) omission	00%	
bariolés	Plural mark (s) omission	00%	
raconter	/e/ verb ending (racontez)	5%	raconté (18.0%)
informé	/e/ verb ending (informer)	2.9%	informés (21.4%)
Décrit	Person mark on /i/ Verb ending (décris)	6.4%	décrite (21.1%)
Ceux	Homophone: ce	6.4%	se: 30.8%



100%
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41