

ON THE ORIGINS OF INDIVIDUAL DIFFERENCES IN WRITING:
INSIGHTS FROM THE CHOICE/NO-CHOICE METHOD
IN ORTHOGRAPHIC ERROR EDITING

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1 - INTRODUCTION

The general goal of this research is to examine individual differences in strategic aspects of written production in general, and orthographic errors editing, in particular. To achieve this end, we used the « choice / no-choice » method. This method enables us to compare what subjects do when they can choose among several strategies to what they do when they cannot. This method was devised by Siegler and Lemaire (1997) to address fundamental issues with regard to strategic aspects of cognitive activities. In the present study, it enabled us to investigate sources of individual differences in strategic aspects of orthographic error editing.

1.0 - French Grammatical Orthography

French grammatical orthography is made of a variety of rules, ranging from easy to very difficult. The difficulty of these rules lies not only in how to carry agreements but also *when to apply these rules* (i.e., on which items or group of items). Mastery of these rules varies from one individual to another. People also differ to the extent they resort to external helps (i.e., using a dictionary, using a spell check on a computer, etc.) to solve orthographic problems. In the present study, we document strategies people use to edit some orthographic mistakes, as well as several strategic aspects of their spelling behavior.

1.1- Method

We selected 72 sentences from a pool of sentences. Each of these sentences included a grammatical orthographic error based on orthographic French textbooks (Bled's « Cours d'Orthographe »).

These sentences were submitted to 12 students who were asked to correct each sentence and rate the level of difficulty of this correction. The level of each sentence was given by (1) the number of correct editing (2) the subjective perceived difficulty. Based on these indices, 36 sentences were considered "easy" and 36 "difficult".

1.2 - Participants

48 adult participants: 12 served as judges, 36 were experimentally tested. Of the 36 experimental subjects, 24 adults participants were divided into two groups on the basis of their orthographic skill. These skills were independently assessed by a general orthographic test (including 50 sentences to be edited). Therefore, 12 students with the highest grade on the independent test were considered as "high-skill students", the other 12 being "low-skill students".

1.3 - Procedure

Participants have to read, edit, and write the correction successively for each of the 72 sentences, with a rotation of three subsets of 24 sentences each for each experimental phases:

- First, students were in a *choice situation* : They could use the spell check.
- Second, they were *required to use a speller* on an other set of comparable sentences.
- Third, they had to do *mental editing corrections* on a new yet comparable set of sentences.
- Half of the participants saw the order free forced spell check forced mental editing.
- The other half saw the order free forced mental editing forced spell check.

Three Dvs were analyzed

- Frequencies of strategies used.
- Frequencies of erroneous corrections.
- Latencies (measured from the appearance of the sentence to the beginning of editing writing).

2. RESULTS

2.1. Strategies Used - (See Fig. 1)

Low Skill participants use more the Spell Check (significantly: $p = .023$) : about 15% more than High's.

The difficult faulty sentences led participants to use about 30% more the Spell Check. ($p = .01$).

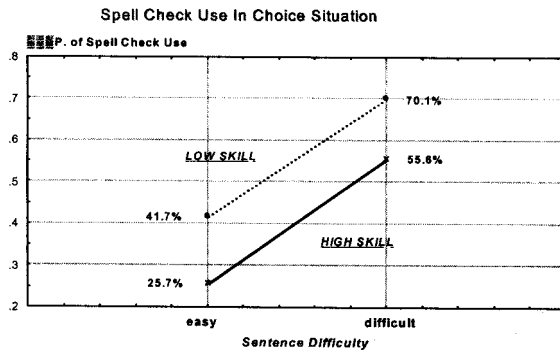


Fig. 1: Percentage of spell check use

2.2. Erroneous Corrections (See fig. 2)

2.2.1. When participants may use spell check

Skill factor differentiates participants only for easy editing ($p = .02$).

Low Skill participants reach for easy or difficult editing, a near rate (even less faults, for difficult editing).

Low Skill participants reach for difficult editing, the same efficiency than High Skill's.

2.2.2. When participants choose to mentally edit

The effect of Easy Difficult factor is significant ($p = .002$). The effect of Skill factor is significant ($p = .022$).

2.2.3. When participants are forced to mentally edit

A clear effect Easy Difficult Editing ($p. < .001$). A good effect on Skill ($p. = .007$).

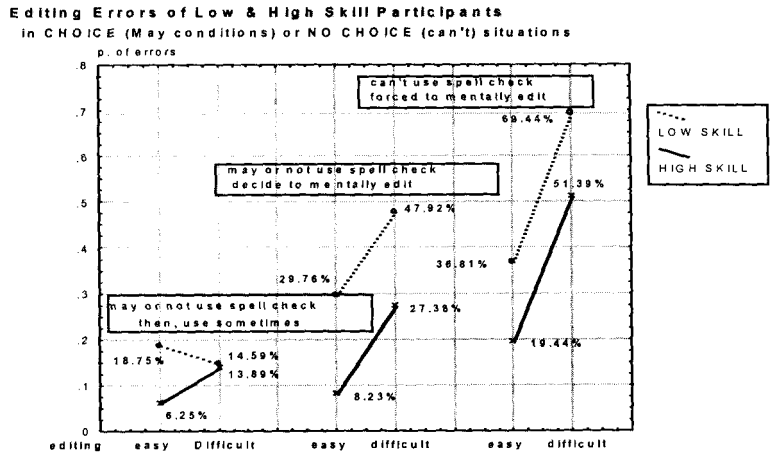


Fig. 2 Percentage of erroneous corrections

2.3. Latencies For Choice Situation (See fig 3)

2.3.1. When participants use Spell check

Low or High Skill participants, easy or difficult can be the orthographic error, spend about the same time to edit.

The slight tendency for High skill's to get lower latencies for difficult faults is not significant.

2.3.2. When they mentally edit

The effect of Skill factor and Easy Difficult one are weakly significant.

($p. = .07$ for skill; $p. = .06$ for difficulty).

2.3.3. The use of Spell Check vs Mental editing

The effect on latency is globally clearly significant ($p. < .001$).

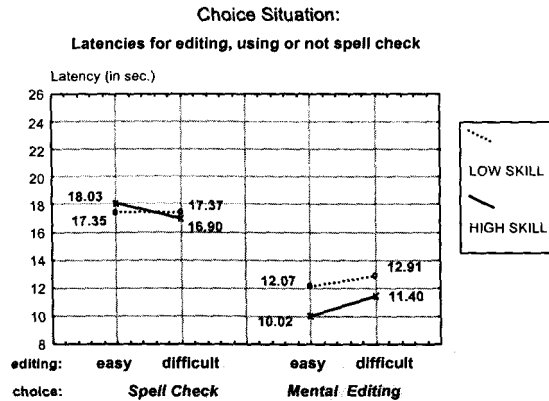


Fig 3 . Latencies in seconds for editing in choice situation

2.4 Latencies For No Choice Situation (See fig. 4)

2.4.1. Forced spell check vs. forced mental editing

A significant effect ($p < .001$), showing shorter latencies for spell [check](#).

2.4.2. Forced spell check

The difference between easy and difficult sentences is significant for both low- and high skill participants.

2.4.3. Forced mental editing

The difference between easy and difficult sentences only shows up for high-skill subjects ($p < .001$).

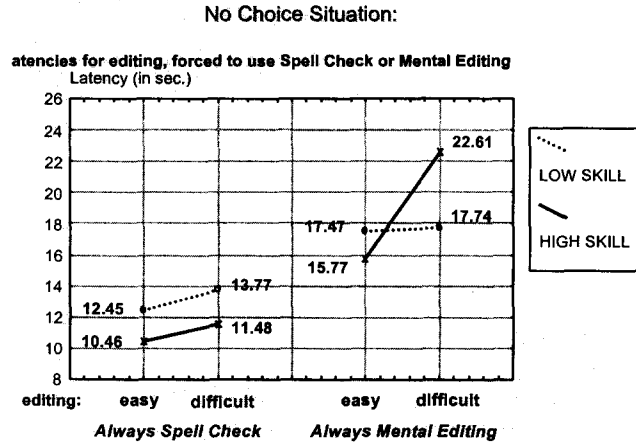


Fig. 4: Latencies in seconds for editing in no choice situation.

3. BENEFITS OF SPELL CHECK USE

3.1 Benefits on erroneous corrections

Comparing forced mental edit to free use of spell check, we can appreciate the efficacy of free use of spell check by comparing the decrease obtained by participants to maximum of decrease (to zero).

3.1.1. Percentages of optimizing with spell check free use (Table 1) (Fig 5)

Table 1: Percentages of erroneous corrections. Percentages of gains with spell check free use.

		LOW SKILL	HIGH SKILL
forced to Mentally Edit	easy faults	36.81%	19.44%
	difficult faults	69.44%	51.39%
free use of spell check	easy faults	18.75%	6.25%
	difficult faults	14.59%	13.89%
absolute gains	easy faults	18.06%	13.19%
	difficult faults	54.85%	37.50%
percentage of optimizing	easy faults	49.06%	67.85%
	difficult faults	78.99%	72.97%

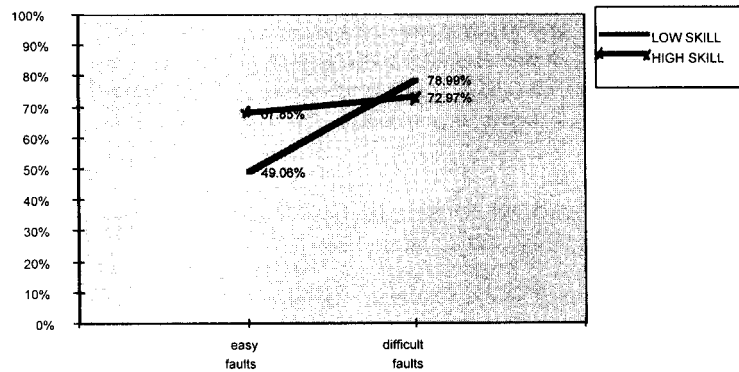


Fig. 5: Percentage of optimizing (top =100%)

Difference for Low skill's easy vs difficult is significant (0.02).

3.2. Benefits on latencies

3.2.1 Expectations about components of latency

Each latency includes

3.2.1.1 A reading time including a try to locate and identify the fault. In this experiment, participants were aware of the necessary presence of a mistake (and only one). On the other hand, previous studies shown that a longer time is occupied when we read a sentence including a fault. Then, we can bet that this time is skill and sentence-difficulty sensitive.

3.2.1.2. If free choice

3.2.1.2.1. Mental editing way

participants think they have successfully located and identified fault : They write directly the editing. The global latency is shorter, but remains skill and difficult editing [sensitive](#).

[3.2.1.2.2](#) Spell check use way

Participants fail to identify errors : perhaps they retry, then, they decide to use spell check. This case spend more time, but it is yet skill and difficult editing sensitive ?

3.2.1.3. If no choice:

[3.2.1.3.1](#) Participants have to always use spell check

It is only adding a short time of calling, reading the diagnosis of spell check, then write the right editing. As this time is added to time 1, which is skill and difficult editing sensitive. Latencies will have a same appearance than free choice mental editing.

[3.2.1.3.2](#) Participants have to always mental edit

On sentences they would mentally edit if they had choice, the schema is as described above, but for others, subjective most difficult editing sentences, they spend more time, until they submit a written solution, faulty or not. In fact, latencies observed mix these two [realities](#).

[3.2.1.4](#) Writing time

To complete, remains a time for writing solution on the graphic board. This time is likely not skill or difficult editing sensitive, concerning the writing of a single word.

3.2.2. Virtual latencies (Fig. 6)

When participants have no choice, latencies for mentally editing the subjectively most difficult sentences can be evaluated theoretically by deducting time observed in *free choice mental editing*, if we assume that the proportion of mental editing chosen if choice were possible approximates the proportion in no choice mental editing of subjectively easier sentences.

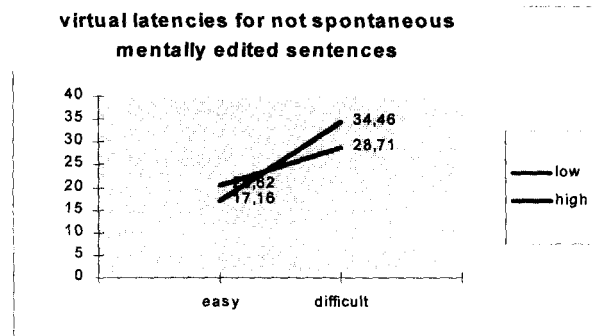


Fig 6: Virtual latencies (in seconds) for subjectively difficult sentences

3.2.3. When the same sentences are spell check solved, there is some time earned ?

Yes, excepted for high skill's in easy editing (Fig 7).

Gain is significant only for both Low and High skill's in difficult editing.

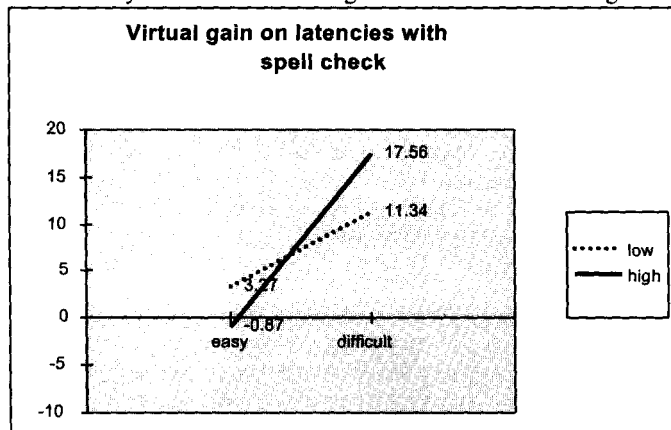


Fig. 7: Estimation of time earned by using spell check on subjectively difficult sentences

4. DISCUSSION : ON THE INTEREST OF FREE USE OF HELP METHOD

4.1. The defective point :

One of the obvious interests of this study is the clear defective effect shown by the participants who choose to mentally edit, and then are wrong : it is the exact point of

separating false knowledge (participants think they are able, in fact they are wrong) and knowledge of a lack of knowledge (participants use spell check).

4.2. Global, but paradoxical benefit:

There is a global, but sometimes paradoxical benefit

4.2.1. For instance, the low skill participants, who are aware of their relative weakness (they estimate themselves significantly under the high skill), by a massive use of spell check, reach the same editing performance than high skill participants for difficult editing sentences.

4.2.2. Nevertheless, high skill participants seems to benefit t globally more of use of spell check than low skill participants, but mainly on latencies.

4.3. Two aspects of skill differentiation

In fact, **there is to deal with two aspects of the skill differentiation** of participants:

4.3.1. *a quantitative difference:*

High skill's know probably more orthographic rules, and the long time they spend when they are forced to mentally edit, related to their rather good efficiency suggests that they span of a bigger repertory of knowledge.

4.3.2. *a qualitative difference*

Either in erroneous editing, or in latencies, various effects are not simply o more or less adjusted to an unidimensionnal variable effect. The analysis of latencies clearly here shows a quicker reactivity of high skill's, which suggests a better mental disponibility of the skill, probably more automated. This « felt but not shown » qualitative effect will drive to conceive others studies for precising.

5. CONCLUSION

Orthographic skill is a complex, multiform skill. By constructing a somewhat empirical disposal concerning V.D., and using the paradigm of choice/ no choice some ways seem to be opened. Multiple strategy use in human cognition appears to be a good disposal for studying writing skills, which orthographic skill is a part. Other aspects of writing would benefit of this very ubiquitous paradigm. And, as we believe strongly, many others aspects of cognitive psychology.

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