

# The Effect of Keyboarding and Presentation Format on the Recall of Accent Marks in L2 Learners of French

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## ABSTRACT

Are there some implementations of technology in the language classroom which lead to measurable advantages over others? Sturm and Golato (in press) found considerable variance on dictée tests within groups of students who practiced a list of accent-bearing target words by handwriting, typing using preprogrammed function keys, or typing using ALT+ numeric codes. These results contradict the results of Gascoigne-Lally (2000), who found that students who typed a paragraph recalled accents better than those who wrote the paragraph by hand. The present study seeks to explore the difference between the two studies. Participants were exposed to Gascoigne-Lally's paragraph, as well as a set of words in both list and paragraph form. One-way ANOVAs revealed no significant differences between groups, although repeated-measures ANOVAs revealed differences within participants on different sets of target words on immediate posttests. The results of this study encourage future research to investigate the results obtained by Gascoigne-Lally as well as Sturm and Golato.

## INTRODUCTION

The current study attempts to provide further insight into a very specific aspect of foreign language acquisition, from a psycholinguistic perspective. In particular, this research is interested in how native speakers of English in the first few weeks of their first semester learning French acquire the accent marks which pepper the French language but are mostly absent from English. Knowing where to put accent marks can prove tedious even for advanced learners. It is a matter of memorizing the spelling of the word, especially for beginners who have no sense of the sound representation of certain diacritics (*é* vs. *è*, for example), or the historical significance of others (such as *ô*).

U.S. English keyboard layouts do not include keys which will produce a letter-accent combination, and U.S. students whose first language (L1) is English are often unfamiliar with techniques for producing such combinations. Due to the explosion of the use of technology in second language (L2) teaching, students are often required to type assignments or use online workbooks or other activities. Because French is rich in written accent marks, using computers

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to write poses a problem for learners: the inclusion of accent marks using various word-processing software or web pages. Teachers know that students who type out their compositions and add accent marks by hand will inevitably miss a word or several. Furthermore, learners need to associate the accent marks with the word as it is produced, and to be able to place the accent mark correctly on the word.

Gascoigne-Lally (2000) suggested that different amounts of psychomotor movement, specifically the fine motor movement of keyboard typing, might have an influence on the acquisition of accent marks in these learners, and other past research has investigated this influence. Sturm and Golato (in press) explored this hypothesis, but found no statistically significant difference between handwriting and two typing conditions. Their results suggest that there is something other than psychomotor movement that contributes to acquisition of accent marks. The present research will examine the format in which target and distracter items were presented (in list or in paragraph form) as a way to explain the divergent findings.

## **REVIEW OF PREVIOUS RESEARCH**

### **Memory**

Memory is a crucial aspect, not only of language learning or learning in general, but of existing. It is a process which happens automatically for many purposes daily, but at which we also have to work diligently for many other purposes. According to Tulving (2000):

Memory is the capacity of the nervous systems to benefit from experience. It is an ubiquitous presence in all higher life forms. It takes many shapes, from simple to complex, from highly specific to most general, from trifling to fundamentally important. (p. 727)

Gleitman (1992) summarizes memory research and theory by dividing it into several components. Remembering is comprised of three aspects: encoding, or processing new information so that it is stored in the memory; storage, or the process of “squirrel[ing] away ... in some more or less enduring form for later use” (p. 172); and retrieval, or pulling the stored information up from its place in the memory.

Two major theoretical approaches to memory are discussed by Gleitman (1992): stage theory and the organizational view. Stage theory suggests that bits of information move through different memory systems; the most important of these systems are the short-term memory and the long-term memory (LTM). A more modern approach, the organizational view, on the other hand, suggests that there is a more active process involved in creating long-term memories. In this approach, the probability of retaining materials in memory depends on how the materials are “processed (that is, encoded)” (p. 177). The more elaborately an item is processed, the more likely it is to be retained and available to be retrieved later. The terms working memory or active memory have replaced short-term memory in this theory. This terminology highlights the difference between remembered information that is active and that which is dormant but retrievable.

Retrieval, the other end of the memory process, is unlike memory storage. Often needing help in the form of retrieval cues, the retrieval process may recreate the context in which

something was learned (the principle of encoding specificity), and often involves a memory search. Memory search can vary in length and difficulty, and is often organized with some well-formulated strategy, or systematic mental flipping through related items. Retrieval that occurs without awareness of remembering is called implicit memory. Remembering is dependent on both encoding and retrieval but also on another factor: what we already know.

There are two types of long-term memory discussed in the organizational view: generic memory, or knowledge acquired, and episodic memory, personal recollections of the events of one's life. Generic memory includes semantic memory, which concerns the meanings of words or concepts, and visual memory, which stores visual experiences.

Forgetting is another important aspect of memory research. Some forgetting reflects faulty storage; other forgetting is caused by conditions at the time of recall. One theory of forgetting, proposed by Hull et al. (1940) suggests that over time memories decay. This theory, according to Gleitman (1992), does not stand up to data which show that time does not cause all memory loss. Another theory of forgetting, proposed by Underwood (1957) involves interference: the idea that memories are not truly lost, just misplaced among other memories. Interference can be proactive (things learned before the target information cause forgetting) or retroactive (material presented after the target information causes memory loss).

Watts and Lazarus (2003) discuss the cognitive perspective of memory, which includes aspects of both stage theory and the organizational approach. According to the cognitive perspective, information can move from sensory registers to short-term or working memory, then to long-term memory. However, the cognitive perspective also recognizes that memory is not a single function, but a set of memory systems which are discrete and interdependent processing units; that not all remembering involves retrieval into consciousness; that the information does not necessarily follow the sensory register → short-term memory → long-term memory path; and that the path is not strictly unidirectional. Watts and Lazarus' definitions of the major components of memory are very similar to Gleitman's (1992), except that Watts and Lazarus (2003) make more distinctions within long-term memory. They suggest that long-term memory can be explicit, or declaratory, which includes both episodic and semantic memory. It can also be implicit, which includes procedural memory, or memory of *how to* do something, such as riding a bicycle, which becomes so automatic that *how to* is rarely consciously recalled as someone performs the task in question. In general, explicit memory refers to knowledge which can be consciously *declared*, while implicit memory cannot be consciously recalled but is manifested in behavior.

Watts and Lazarus (2003) also explore the phenomenon of encoding more deeply than Gleitman (1992). According to the researchers, “effective LTM rehearsal requires forming associative links to previously stored information” (Watts & Lazarus, p. 363). Not only does new information need to be processed, it needs to be *hooked* to some pre-existing memory in order to be stored in LTM. In terms of encoding, the more deeply or elaborately information is encoded, the more durable it is in memory. Information processed at a surface level (e.g., a subject performing a task based on the visual features or letters of a word) is lost more easily than information processed at a phonetic level (e.g., a subject determining whether one word rhymes with another), which is more easily lost than information processed at a semantic level (where a task involves consideration of the meaning of the word). In other words, information that is semantically processed is most easily tied in to previous memories.

Encoding of information and its effect on retrievability of said information has been a widely-discussed aspect of memory research for more than 30 years. Craik and Lockhart (1972)

proposed a framework of memory research involving levels of processing, which suggested that the more deeply new material is processed, the better and longer it will be recalled. In this framework, *depth of processing* refers to the degree of semantic or cognitive analysis required to process the material. Such analysis involves “processing by enrichment or elaboration. For example, after a word is recognized, it may trigger associations, images, or stories on the basis of the subject’s past experience with the word” ( Craik and Lockhart, 1972, p. 675). In other words, the more intricate the analysis (semantically or cognitively) of the material, the more deeply it is said to be processed. Retention is said to be a function of depth, which is determined by a number of factors, such as the amount of attention devoted to the material, its compatibility with the analyzing structures, and the processing time available. Material will be lost at a rate appropriate to the level of depth at which it was processed; thus, material more deeply processed will be lost at a slower rate than that processed more superficially.

The levels of processing framework sparked a deluge of research. Among the researchers referring to Craik and Lockhart’s (1972) theory were Craik and Tulving (1975), who performed ten experiments exploring the levels of processing framework. From the results of these experiments, Craik and Tulving drew several conclusions. A continuity between incidental and intentional learning was demonstrated; in other words, if the material was encoded to an appropriate level or engaged correctly by the orienting task (i.e., if the orienting task was such that it caused the material to be encoded), learning could take place whether or not the subject intended to learn. Mental activity was thus posited to cause learning and retention, and memory performance to depend on the elaborateness of the encoding. The researchers also suggested that spread, rather than depth, of encoding, might be a more useful concept for explaining differential effects of orienting tasks.

Postman, Thompson, and Grey (1978) provide a definition for spread of encoding: “the elaboration of a stimulus in the course of an encoding operation” (p. 681). In other words, spread of encoding refers to the extent to which a stimulus is processed, and thus encoded. They also provide some caveats for exploring the levels of processing framework, most notably, that one must employ tasks which differ only in respect to the prescribed level of processing. All other aspects should be held constant. Thus, researchers should prepare the same tasks for all participants/conditions being compared, and vary only the conditions.

Regarding distinctiveness, Hunt and Mitchell (1978) found that orthographic distinctiveness increased free recall regardless of whether the encoding task called attention to the orthographic features of the word. Diacritics could make a word orthographically distinct for L2 learners whose first language does not use them.

Tulving (2000) explains the role of encoding in a standard memory task in the following way. Information which is to be remembered is encoded into storage and either consolidated (“a biologically determined autonomous process that runs its course independently of the interpolated activity”) or recoded (“an active psychological process ... shaped by the particulars of the interpolated activity”) during the retention interval, before it is retrieved to fulfill the requirements of the task (p. 729). It is in the working memory that the encoding process takes place.

## Typing

Cohen and Wickland (1990) found that:

... typing performance can be largely accounted for by three component abilities: spelling, memory for the keyboard, and motor skill. Taken collectively, these three variables are significant predictors of typing performance. They may be viewed as reflecting three aspects of typing: (a) the parsing of words into letters, (b) the conversion of letters into movement specifications, and (c) the integrated execution of specified movements. (p. 28)

The three aspects of typing, as described by Cohen and Wickland and supported by the results of their study, are also reflected in John's (1996) TYPYST model and Kellogg's (1996) model of working memory in writing.

Cohen and Wickland (1990) also found that short-term memory, as measured by digit span, was more closely related to spelling ability than any of the other variables investigated. They suggest that this relation is due to an involvement of lower-level (i.e., short-term or working memory) encoding in spelling ability. Whatever the reason, a connection between spelling ability and working memory is suggested by Cohen and Wickland's results.

## Typing and Irregular Orthography

Service and Turpeinen (2001) investigated working memory in spelling by asking participants to type words in their L1 backwards. Word length had a significant effect on time per letter but not on proportion of errors. Familiar words typed backwards can be said to have *unusual* orthography, at least as they are being typed backwards. Service and Turpeinen's observations suggest that some aspects of normal typing carry over into typing words with unusual orthography.

However, Bloemsaat, Van Galen, and Meulenbroek (2003) found that irregular orthography did have some effect on typing in that it slowed the participants' typing speed. Bloemsaat et al. suggest that the increased interval time "would ... reflect changes of one or more of the processes involved in transcription typing" (p. 130). There was also a significant interaction between orthographic irregularity and memory load in this study.

To the extent that L2 words for beginning learners are orthographically unusual, for example, if the L2 has accent marks and the L1 does not, a difference in the typing process for typing in the L2 would be expected. The question remains, what difference? How much difference and how does this difference manifest itself? What specific effects might accent marks have on typing considering that, in order to make French accent marks, L1 English typists must type key combinations that are not necessary in their L1?

## More Movement = Better Learning

Gascoigne-Lally's (2000) study directly inspired the research question explored in Sturm and Golato (in press), which is the direct inspiration for the present research. Collecting data over four semesters at two different universities, Gascoigne-Lally found that university students who typed a passage in French had better recall of the diacritics in the passage when they heard it

as a dictation exercise than those who wrote out the same passage by hand. From these results, she posited that it was the extra psychomotor steps involved in typing that caused the improved recall.

However, Cunningham and Stanovich (1990) found that first graders recalled words better on a spelling test when they had learned the words by writing them out by hand than by arranging tiles or typing the words on a computer keyboard. While these results would seem to refute the idea that typing leads to better learning, in this instance the handwriting condition could be considered to involve more psychomotor steps than typing or arranging tiles. In this study, typing involved single keystrokes by participants who had not yet learned to type. Arranging tiles was a matter of simple manipulation of objects. By these measures, handwriting or printing the letters was the most skilled and elaborate physical movement of the three conditions.

Vaughn, Schumm, and Gordon (1993) sought to explore Cunningham and Stanovich's (1990) results with learning disabled and non learning disabled fourth-graders. In their experiment, the three conditions involved were typing, handwriting, and arranging letters and then tracing them. No difference was found between the three conditions. However, it must be considered that their third condition involved more psychomotor steps than the original arranging tiles condition. In this study, participants first arranged the letters, and then traced them, which significantly increased the amount of hand movement for the condition. Additionally, as Vaughn et al. mention, their participants were of a different socioeconomic status than those who participated in Cunningham and Stanovich; the Vaughn et al. participants may have been more motivated when using the computer because it was more of a novelty to them than to the children involved in Cunningham and Stanovich's work.

In discussing these two studies, it is also important to note the difference between elementary age children and adults. For children, handwriting is more laborious and the "typing" is a rudimentary tapping of keys, whereas for adults, handwriting is a skill successfully mastered years prior and typing is a more coordinated, systematic process. Furthermore, Cunningham and Stanovich's (1990) and Vaughn et al.'s (1993) participants were working with their L1; the present study looks at learners working with their L2.

Heift (2003) examined the effect of the type of CALL (computer-assisted language learning) exercise on L2 students learning German sentence structure. She found that there was a significant difference between clicking on multiple choice questions and the other two conditions (dragging words to form a sentence or typing the sentence). Students who used the clicking scored significantly lower on a post-practice test. There was no significant difference between the dragging and typing conditions, however. Heift noted that the students who dragged words or typed sentences made the most mistakes during treatment; it therefore follows that there were more psychomotor steps involved in their treatment, caused both by the nature of their treatment condition and by their increased number of mistakes.

Hummel, Kirsammer, and Gerloff (2003) examined ipsilateral cortical activity (electrical activity localized to one side of the cerebral cortex, measured by electroencephalogram, or EEG) during finger sequences of varying complexity; half were memorized (MEM) and half were novel to the participants (NOV). There was no difference between the MEM and NOV conditions, but activity increased as the complexity of the finger sequences increased. Because increased movement increased electrical activity on one side of the brain, we might consider the complexity of finger sequences to be similar to deeper encoding of items, as described by Craik

and Lockhart (1972). When this complexity of finger movement is connected to words in an L2, the *electrical encoding* may lead to better acquisition of the word in question.

Sturm and Golato's (in press) goal was to investigate the hypothesis proposed by Gascoigne-Lally (2000) by looking at different motoric conditions, including two keyboarding conditions (one using preprogrammed function keys, and one using ALT+ numeric codes) with foreign language learners, looking specifically at recall of French diacritics. The two keyboarding conditions should have different effects on the participants if the research hypothesis is true: the extra motor steps in the ALT+ codes should cause better recall. Similarly, creating diacritics with preprogrammed function keys (the keys above the number keys on a standard keyboard) should be more effective than handwriting, because the learner has to go outside the body of keys normally used, which makes typing the diacritics distinctive. Having two distinct keyboarding conditions was intended to help to tease apart any habituation effects from using a computer from the actual effects of the condition.

Sturm and Golato (in press) could not conclude that practice condition (handwriting, simple keyboarding, or extended keyboarding) had a significant effect on acquisition of accent marks. Results showed such considerable variance within groups that the groups were not statistically significantly different. These findings directly contradict those obtained by Gascoigne-Lally (2000). Therefore, a discussion of the differences between Gascoigne-Lally (2000) and Sturm and Golato (in press) follows.

First, Gascoigne-Lally (2000) did not include a pretest in her methodology. As a result, there is no guarantee that her groups were equal at the outset. She noted that her data were collected over four semesters, at two different universities. It is entirely possible that the difference observed between groups was a result of inherent differences in the learners' prior knowledge or ability in diacritical marks. Sturm and Golato (in press) included a pretest for that very reason and were thus able to state that there was no significant difference between groups at the outset of the study.

Second, Gascoigne-Lally (2000) gave target words in the context of a short passage, while in the present study, target items were arranged in a list. Other previous research which looked specifically at spelling recall (Cunningham & Stanovich, 1990; Vaughn et al., 1993) used a list format as well. It may be that the sentence/passage format facilitated recall in all conditions. According to Craik and Lockhart (1972), "if the words form a meaningful sentence ... they are compatible with deeper learned structures and larger units may be dealt with ... we rehearse a sound, an idea, or an image in the same way that we perceive objects and not constellations of attributes" (p. 679). These differences suggest that more carefully controlled research in contrasting word-level and sentence-level carriers is called for; this suggestion will be elaborated upon below.

In order to investigate the difference between words presented in a passage and words presented in list form, Sturm and Golato (in press) proposed a study where one group is exposed to the words in a passage, and the other is exposed to the same target and distracter words in a randomized list.

From the results of Sturm and Golato (in press), the following research questions are posed:

1. What is the effect of mode of practice (handwriting vs. one-stroke keyboarding vs. extended keyboarding) on the recall of accent marks in L2 learners of French?

2. What is the effect of the format of presentation (list vs. paragraph form) on the recall of accent marks in L2 learners of French?

In order to answer these research questions, the following null hypotheses will be tested:

- H1. Mode of practice (handwriting, one-stroke keyboarding, or extended keyboarding) will have no effect on recall of accent marks in L2 learners of French whose L1 is English.
- H2. Format of presentation (list or paragraph) will have no effect on recall of accent marks in L2 learners of French whose L1 is English.

## **METHODOLOGY**

In order to test the hypotheses set out above, an experiment was carried out which sought to investigate the difference between target words presented in list form and target words presented in a paragraph.

### **Participants**

Participants ( $n = 25$ ) were French 101 (first-semester French) students at the University of Illinois at Urbana-Champaign who had never studied French before and whose L1 is English. These factors were verified by a biographical questionnaire, administered at the time of recruitment. Two participants who consented to participate were native speakers of languages other than English or were simultaneous bilinguals, and so were excluded. Additionally, seven other participants were excluded: three who had already studied French, three who missed one or more days of the study, and one who did not complete the entire pretest, reducing the final group size to 16. One participant missed the delayed posttests but was still included in analyses of the pretest and immediate posttests. Recruitment took place in class and was done by the researcher. The participants were informed that they would be participating in a study investigating how beginning learners of French learn spelling. After all data were collected, the researcher debriefed the participants.

In addition to information about language background, the biographical questionnaire elicited information about typing skill. Participants were asked to rate themselves on a Likert-type scale on their typing abilities. Additionally, specific questions about typing experience and habits were included. Finally, participants were asked whether they were right- or left-handed, and if they had normal or corrected-to-normal vision.

### **Materials**

The testing materials consisted of three sets of target items. The first was the paragraph used by Gascoigne-Lally (2000). The second was a word list similar to that used by Sturm and Golato (in press), but only including accent marks which indicate pronunciation. In other words, target items with *é*, *è*, and *ç*, were used, but not items with the circumflex. The tréma was also excluded, as it was extremely difficult to find words matching the other target items for



frequency, but not resembling English words. The third was the items from the word list, but in paragraph form. All participants were asked to practice and recall all three sets of words.

Target items for the list and second paragraph were taken from *Rendez-vous* (Muyskens & Omaggio-Hadley, 2002), the text used in the participants' French class, as a control of frequency. Words that appeared in the text before or during the experimental period were excluded, as well as words which resemble English words (cognates), and words spelled with more than one accent mark. An equal number of (accent-less) distracter items were added to the list and second paragraph, matched for length to the target items. All 12 words and distracters were nouns. None of the other words in the paragraph had accents marks. To generate the list, words were written on cards and drawn from a hat, and written down in the order in which they were drawn.

From these target items, two tasks were created. The first, a recognition task, asked participants to simply select the spelling that they thought was correct for each target word or distracter. There were three choices for each word, which differed only on the accent mark; for target items, the word was presented with the appropriate accent mark, once without an accent mark, and once with an incorrect accent. Three versions of the recognition task were generated; first, with the words in alphabetical order, and two versions in which the words were in different randomized orders. The second task, a dictée task, asked participants to write out the paragraphs and word list from aural dictation. In the recognition task, all target words and distracters were arranged into a list, while the dictée task presented them in the formats in which the participants had practiced them.

## Procedure

The experiment took place over the course of several weeks. On the first day, accent marks were presented to all French 101 classes, via a lesson plan written by the researcher. All French 101 teaching assistants were trained by the researcher to use the lesson plan, so that all classes received as similar a presentation as possible. Two class days after accent marks were introduced to the participants, a pretest was administered in class. The pretest consisted only of the recognition task. The objective of the pretest was to ensure that all groups had equal knowledge of French diacritics at the outset of the study. Participants were grouped by intact classes into the three treatment conditions: handwriting (HW),  $n = 6$  (for delayed posttest,  $n = 5$ ); function keys (FK),  $n = 4$ ; and ALT+codes (AC),  $n = 6$ . On the next class day, the instructor of each class distributed a sheet on which the target items appeared, and read it aloud. This was to ensure that participants had a chance to match the visual form of the word with the aural form they later heard on post-practice tests. After each instructor finished reading the items out loud, she collected the sheets of paper from the participants.

One week after the pretest, participants met in the lab for a regularly-scheduled Internet day. Sheets with the target items were distributed to the participants in the lab, and they were asked to copy the items, using the assigned practice condition: handwriting, preprogrammed function keys, or ALT+numeric codes. Participants in the ALT+code group were given a list of accent marks and codes needed to produce them in MS Word. Although Sturm and Golato (in press) labeled the preprogrammed function keys, indicating the letter/accent mark combination associated with each key, the present study did not do so. Rather, a list of function keys and letter/accent mark combinations, similar to the ALT+code list, was distributed so that both typing conditions would be as equal as possible in all ways, except for number of keystrokes.

Participants in the handwriting group used pen and paper to copy out the target items. Participants in the function key or ALT+codes group were asked to type using the Microsoft Word software. The researcher turned off the auto-correct feature, as this feature of MS Word will correct French words which resemble English words. This auto-correction made Sturm and Golato's (in press) participants uneasy and sometimes influenced participants to retype the words. Once the participants finished copying, the sheet with the target items was collected, and they were given a second version of the recognition task. After all participants finished the recognition task, it was collected, and the instructor gave them the dictée task.

One week after the lab session and immediate posttest, participants were given a delayed posttest, which consisted of a third version of the recognition task and the dictée task. The delayed posttest was administered in class by the teaching assistants. Table 1 shows a summary of the study's timetable:

**TABLE 1**  
**Timetable**

Schedule	Activities
Day 1	Presentation of Accent Marks
Day 3	Pretest (In Class)
Day 4	Exposure to Target Items
Day 10	Treatment, Immediate Posttests
Day 17	Delayed Posttests

## RESULTS

Table 2 shows the mean scores and standard deviations for each group on each task and for all groups combined on each task.

**TABLE 2**  
**Mean Scores and Standard Deviations (N=16)**

	Pretest Mean	Pretest SD	IP Recog Mean	IP Recog SD	IP Dictée Mean	IP Dictée SD	DP Recog Mean	DP Recog SD	DP Dictée Mean	DP Dictée SD
Function Key	10.50	3.17	13.75	1.71	11.86	7.96	13.00	2.45	11.00	11.07
Handwriting	8.83	3.37	13.17	2.93	12.08	4.55	12.40	4.22	9.10	7.59
Alt +Codes	10.00	2.76	14.17	2.93	19.08	4.02	13.83	1.47	14.50	6.77
All Groups	9.69	3.00	13.69	2.55	14.66	6.13	13.13	2.75	11.77	8.06

Note. IP = Immediate Posttest; DP = Delayed Posttest

Dictée tasks were scored using Gascoigne-Lally's (2000) rubric: +1 for a correctly placed accent; -1 for an incorrect accent; 0 for a missing accent; and -.5 if the participant confused the accent grave and accent aigu (e.g., *thè* for *thé*). Recognition tasks were scored +1 if the correct

spelling was chosen, 0 if either of the incorrect spellings was chosen. The highest score possible for the recognition tasks was 17; for the dictée tasks, 23.

The descriptive statistics reveal a variation within groups which is reflected in the statistical analyses described below. Most notably, the FK group's standard deviation for the immediate posttest dictée task was 7.96, while the mean was 11.86; in other words, the standard deviation was not much smaller than the mean. By contrast, the other two groups' means were higher and their standard deviations smaller (HW mean = 12.08,  $SD = 4.55$ ; AC mean = 19.08,  $SD = 4.55$ ). For the FK group, also, on the delayed posttest dictée task, the standard deviation was actually higher than the mean score ( $SD = 11.07$ ; mean = 11.00). The other two groups' standard deviations on this task were smaller than the FK group, but not by much: (HW mean = 9.1,  $SD = 7.59$ ; AC mean = 14.5,  $SD = 6.77$ ). However, the FK group has the smallest standard deviation on other tasks, such as the immediate posttest recognition ( $SD = 1.71$ ; mean = 13.75) while the other groups' means (AC mean = 14.17; HW mean = 13.17) are similar but their standard deviations are much higher (AC  $SD = 2.93$ ; HW  $SD = 2.93$ ).

Furthermore, although a one-way ANOVA  $F(2, 13) = 0.39, p = .69$  showed no significant differences between groups on pretest scores, there was considerable variation within each group: FK  $SD = 3.32$ ; HW  $SD = 3.37$ ; AC  $SD = 2.76$ . In other words, 68% of the FK group scored between 7.18 and 13.32; 68% of the HW group scored between 5.46 and 14.20; and 68% of the AC group scored between 7.24 and 12.76. The range of scores that fall within one standard deviation is larger for the HW group than the other two groups. The groups were not significantly different at the outset, but neither were they homogeneous.

On the Immediate Posttest (IP) Recognition task, a one-way ANOVA  $F(2, 13) = 0.20, p = .81$  revealed no significant differences between groups. A one-way ANOVA  $F(2, 13) = 3.27, p = .07$  on the Immediate Posttest Dictée task showed no significant differences between groups, although results approached significance. This result will be addressed further below. Overall, these results suggest that there was no effect of practice mode on recall of accent marks.

Neither of the Delayed Posttest (DP) tasks showed significant differences between groups: Recognition task  $F(2, 12) = 0.34, p = .72$ ; Dictée task  $F(2, 12) = 0.60, p = .56$ . These results suggest that there was no long-term effect of practice mode on long-term recall of accent marks.

In order to investigate the effect of presentation format on the recall of accent marks, a series of repeated-measures ANOVAs (two-factor ANOVAs with repeated measures on one factor) were performed. The between-subjects factor was practice mode and the within-subjects measure was the presentation format. The repeated-measures ANOVA for the Immediate Posttest Recognition task showed no significant difference between groups  $F(2, 12) = 0.31, p = .74$  but a significant difference within groups on the sets of target items  $F(1, 12) = 23.35, p < .01$ . There was no interaction between the two factors  $F(2, 12) = 0.16, p = .85$ . For the recognition task, there were only two sets of words, the set from Gascoigne-Lally's (2000) study and those chosen specifically for the present study. The mean score for Gascoigne-Lally's words was 83%, and the mean score from the words from the present study was 49%.

On the Immediate Posttest Dictée task, a repeated-measures ANOVA showed a significant difference  $F(2, 13) = 3.87, p = .05$  between the groups and also within subjects  $F(1, 13) = 4.92, p = .01$  but no interaction between the two factors  $F(2, 13) = 0.89, p = .48$ . For the dictée task, there were three sets of words analyzed separately as different formats: Gascoigne-Lally's (2000) paragraph (IP dictée mean score = 54%), the words chosen for the present study in

word list format (60%), and the words chosen for the present study in paragraph format (42%). Between groups, the mean scores were FK = 45%, HW = 42%, and AC = 67%.

For the Delayed Posttest tasks, there were no significant differences either between groups or within groups: DP Recognition between groups  $F(2, 12) = 0.24, p = .79$ ; within groups  $F(1, 12) = 0.04, p = .84$ ; DP Dictée between groups  $F(2, 12) = 0.80, p = .47$ ; within groups  $F(1, 12) = 0.52, p = .60$ . There was no interaction between the factors on either task: DP Recognition  $F(2, 12) = 0.63, p = .55$ ; DP Dictée  $F(2, 12) = 0.50, p = .74$ .

## DISCUSSION

From the results of the one-way ANOVAs performed on participants' scores by group, the null hypothesis of the first research question was not rejected: there was no significant difference in recall of accent marks between groups of participants who practiced the words differently. However, the results of the repeated-measures ANOVAs did reveal a significant difference on one task, which suggests that a closer look into the results is warranted. Also, the one-way ANOVA on Immediate Posttest Dictée task did not show a significant difference, although the  $p$ -value nearly reached significance ( $p = .07$ ). It is worth noting that the FK and HW groups' mean scores on this task were very close to each other (FK = 11.89; HW = 12.08) but the AC group mean score was much higher (AC = 19.08). Additionally, the variance within the FK group was much higher (63.40) than either of the other groups' (HW = 20.74, AC = 16.14). The FK group was the smallest group,  $n = 4$ , and the scores were 7.5, 23.0, 5.0, and 12.0. It is reasonable to conclude that the lack of a statistically significant difference can be traced to the variance of scores in the FK group, and that repeating the study with a larger group might yield statistically significant results.

For the Immediate Posttest Recognition group, there was a significant difference between Gascoigne-Lally's (2000) target words and those chosen for the present study; participants recalled Gascoigne-Lally's words at a higher rate. This is surprising in light of the fact that the words chosen for this study were presented twice (a design flaw that will be corrected in future research). However, Gascoigne-Lally chose her words as an intact paragraph adapted from a beginning French textbook. I would question this method of target item selection as the target items selected for the present study were chosen along strict guidelines. None of the items in the current investigation were English cognates, each target item bore only one accent mark, all target items were nouns, and proper names and nationalities were excluded. Gascoigne-Lally's words (see Appendix for complete list of target items) included several English cognates, words with two accent marks, proper names, and nationalities.

In order to investigate the differences between Gascoigne-Lally's (2000) target items and those chosen for the present study, a repeated-measures ANOVA was performed on the pretest scores. The between-subjects factor was the practice condition (FK, HW, and AC) and the within-subjects factor was the set of target items (cf. Gascoigne-Lally, 2000). There was no significant difference between the groups  $F(2, 13) = 0.37, p = .70$ . However, the difference within groups on the two sets of target items just missed significance  $F(2, 13) = 3.39, p = .09$ . The average mean scores for the entire group (all three practice conditions, or class sections, together) were, for Gascoigne-Lally's words, 61%; for the words chosen for the present study, the mean was 49%. From this 12% difference it is reasonable to believe that there was an inherent difference in how well participants could recognize the correct accent placement on the

two sets of target words. This may account for the difference between Gascoigne-Lally's results and those of Sturm and Golato (in press). As Gascoigne-Lally chose her words as an intact paragraph, which she adapted from a beginning French textbook, and both Sturm and Golato and the author of the present study used words which were meticulously and individually selected, it is recommended that future research follow the latter method. This recommendation is also suggested by the difference in recognition performance on the pretest.

## CONCLUSION

From statistical analyses of the results, the null hypotheses set out above cannot be rejected. However, there is strong motivation for further research, which reflects the limitations of the present study and others reviewed here. First, the number of participants was far too small. This is often the case in classroom studies with multiple testing sessions, but, particularly considering the results of the Immediate Posttest Dictée task, it is entirely possible that a larger sample might reveal significant differences between groups. Second, there was an unequal number of participants per group (the function key group was smaller than the other two groups), resulting in unequal cell size. Third, the target words chosen for the present study were presented twice to all participants, in paragraph and in word list form. In future studies, there should be six groups. Two groups will use each practice mode, and within each practice mode, one group will be exposed to the words in list form and the other will be exposed to the words in paragraph form. Fourth, the treatment was of limited duration; participants only practiced the words one time. In future research, participants could be asked to practice the sets of words several times over a period of time. Finally, in future studies, the dictée task will be given before the recognition task in both posttests. By administering the recognition task before the dictée task, participants' recall of the target items may have been affected by having just seen the correct spellings (along with several incorrect spellings).

In addition to the limitations of the study, a number of other possible changes are suggested. First, a change in the scoring system is proposed in order to better reflect the nature of learner errors in accent placement. Second, it may be advisable, given this researcher's reservations about Gascoigne-Lally's (2000) target items, to exclude them from the study and simply use a carefully crafted list of target words such as was used here. Considering the high scores achieved on the pretest, it may be fruitful to use less frequent words. Additionally, the recognition tasks should include four choices, not three, to lower the chance score. Most importantly, in order to investigate other possible intervening variables in Sturm and Golato's (in press) results, data should be collected on participants' ability to pronounce the target items and on participants' working memory.

## ACKNOWLEDGEMENTS

The author wishes to thank Peter Golato for his innumerable contributions to this research, Alice Omaggio Hadley for her suggestions, Melissa Bowles for her thoughtful feedback and comments, and the anonymous reviewers for their suggestions and comments. All errors that remain are mine.

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## APPENDIX

### Target Items

1. Paragraph from Gascoigne-Lally (2000):

Bonjour. Je m'appelle André. Je suis algérien. J'adore le théâtre, la télévision, et l'opéra. Voilà Joëlle, une copine sénégalaise, et son ami Frédéric. Frédéric est français et il habite à Paris.

2. Word list:

Original:

garçon	tennis
façon	match
déjeuner	autobus
thé	bar
grève	carte
siège	stade

Randomized:

déjeuner	façon
bar	siège
thé	match
carte	garçon
autobus	grève
stade	tennis

3. Paragraph:

Le garçon va au match de tennis au stade. Comme il y a un grève de la SNCF, il utilise sa carte d'autobus. Il trouve un siège. Avant le match il va prendre son déjeuner et un thé au bar. C'est une façon de s'amuser!