Producing isolated words from pictures, from orally and visually presented words: An on-line study of naming and writing

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ABSTRACT

Lexical access has been widely studied in the field of oral production. By contrast, to our knowledge, lexical access in written production has never been studied (excepting an attempt by Foulin, 1993). The current experiment was conducted to investigate lexical access in comparing written and spoken latencies. A pre-experiment was carried out to select an appropriate set of stimuli (pictures commonly named, easily identified and correctly spelled). In the experimental tasks, some subjects had to write down -and some others to name aloud- words from different kinds of input: pictures, orally presented words and visually presented words. The items used varied as to the following dimensions: frequency and regularity of spelling. Main results interpreted in relation to lexical access in oral production concur with the view that: (1) pictures — as opposed to linguistic input (auditorily and visually presented words) — have no direct connection with word representations within the mental lexicon; (2) orally presented words are not spelled via a nonlexical route; (3) frequency effects observed in written production are related neither to lexical density nor to sublexical units; (4) phonological information does not seem to be necessary for the retrieval of orthographic information.

1 INTRODUCTION

Writing production has traditionally been a stepchild of psycholinguistics while substantial studies have dealt with oral production. Consequently the study of oral production is more advanced than that of written production (see for oral production: Bock, 1982, 1987; Dell, 1986; Garrett, 1980, 1982; Levelt, 1989; Levelt & Maassen, 1981; Levelt, Schriefers, Vorberg, Meyer, Pechmann & Havinga, 1991a; Schriefers, 1992; for written production, see: Hayes & Flower, 1980; Martlew, 1983; Scardamalia & Bereiter, 1986).

Researchers generally find that lexical access in speech production involves the following major processing stages: a conceptual, a semantico-syntactic (i.e. retrieving lemmas[1] (for an extensive discussion about lemma retrieval in speaking, see Roelofs, 1992) and building a syntactic structure for the utterance), a phonological, and an articulatory stage (Dell, 1986; Kempen & Huijbers, 1983; Levelt, 1989; for a brief review on lexical access in speech, cf. Ferrand, 1994). The distinction between semantic and phonological stages has received empirical support from the analysis of failures of access (TOT states; cf. Brown & McNeill, 1966; Meyer & Bock, 1992), slips of the tongue, and speech errors (Fay & Cutler, 1977; Garrett, 1980, 1982, 1988). However, the controversial problem of how these different kinds of representations are retrieved during the time course of lexical access is currently generating exten-

sive discussion (Dell & O'Seaghdha, 1991; Harley, 1993; Levelt, Schriefers, Vorberg, Meyer, Pechmann & Havinga, 1991b). Following Schriefers, Meyer and Levelt (1990), the selection of an item and its phonological encoding occur in two successive, non-overlapping stages: During lemma access, semantic but not phonological information is active, while the reverse is true during phonological access (cf. also Levelt, Schriefers, Vorberg, Meyer, Pechmann & Havinga, 1991a). By contrast, for authors such as Dell and O'Seaghdha (1991) a temporal overlap occurs between these two stages[2]. However, this current controversy will not be discussed in this chapter.

To our knowledge, up until now no research has dealt with lexical access in written production (cf. Foulin, 1993). A current problem concerns the role of phonological information in writing (Portier, Van Galen & Thomassen, 1993). There are arguments supporting the hypothesis that phonological information is activated during written production. For example, analyses of slips of the pen (Ellis, 1979; Hotopf, 1980) reveal that sometimes writers produce a word similar in sound to the intended one but not related in meaning (e.g. *there* for *their* [3]) (cf. also Largy, Fayol & Lemaire, submitted). Experimental studies on serial recall of lists of words in writing have shown that words that did not share phonological features were recalled better than when they did share phonological features (Coltheart, 1993; Conrad, 1964). The latter result also supports the hypothesis that phonological information is activated during written production. While phonological information may be retrieved during writing, there is also evidence, as shown by neuropsychologists, that in a number of cases of brain-damaged patients, written performance is affected less than spoken production (Rapp & Caramazza, 1994). For example, Lhermitte and Derouesne (1974) described a patient, 74% of whose written production was correct, as compared to only 8% of his oral production. Such cases are problematic for the phonemic mediation claim since it is difficult to argue that spoken neologistic responses could form the basis for the retrieval of correct written responses. Besides, some graphemes in words are not pronounced, but people are still able to spell these words correctly (Fayol, Largy & Lemaire, 1994). For example in the French language, some silent graphemes have no phonological correspondence (e.g. *h* in *harpe* (harp)) (Véronis, 1986). Also problematic for a phonological mediation hypothesis in writing is the selection of the correct spelling of homophones (Ellis, 1984). Thus, if phonological information is active during writing, it seems it would not be necessary to retrieve orthographic representations (theorists of the mediation theory such as Luria (1970)[4] would advocate the contrary). Orthographic information could be retrieved directly and would not be mediated by phonological information (cf. the Orthographic Autonomy Hypothesis, Rapp & Caramazza, 1994) even if, as we claim, phonological representations could be activated parallel to orthographic representations. Thus, we share Ellis' (1984) view that: (1) orthographic forms and phonological forms are retrieved from two separate word production systems; (2) phonological forms provide a supplementary input to the graphemic lexicon. In this context, what could be the role of phonology in writing? Our preliminary hypothesis is, as suggested by Ellis (1982), that phonological information in writing could serve a "sequencing and keeping-track" function and could also serve a "monitoring and evaluating" function.

The purpose of the present study was to investigate how orthographic representations are computed during the written production of isolated words from different kinds of input (pictures, orally and visually presented words) in order to gai

insight into the nature of the representations and into the processes involved. To do that, we decided to compare written and spoken latencies. We carried out an experiment in which some subjects were asked to write down words while others were asked to say aloud words elicited by different kinds of input: pictures, words presented auditorily and words presented visually. The words used varied as to the following dimensions: frequency (high vs low), and regularity (regular spelling vs irregular spelling). Written and oral latencies (also called RTs) were recorded. The proposed theoretical framework distinguishes between lexical and nonlexical procedures in spelling and also in naming (for evidence concerning the distinction between lexical spelling and nonlexical spelling, see for example Ellis, 1982; but see also Campbell, 1983 and for the distinction between lexical route and nonlexical route in naming written words, see for example Forster & Chambers, 1973 and for a contrasting point of view, see Kay & Marcel, 1981; Rosson, 1983).

Concerning the way orthographic representations are accessed from the different types of input considered, the following hypotheses were tested:

(1) It is commonly argued that, after the visual stimulus is analyzed, there exists an intervening and more abstract stage involving semantic access (Vitkovitch & Humphreys, 1991). According to Levelt (1989), to retrieve a verbal label, speakers could bypass neither conceptual identification nor lemma retrieval (see also Roelofs, 1992). The assumption that names associated with pictures are retrieved indirectly and that word representations can be directly accessed from the lexicon has been supported for example by interference studies (Glaser & Glaser, 1989; Smith & Magee, 1980[5]). Thus, our hypothesis was that pictures, contrary to linguistic input, have no direct connection with orthographic and phonological representations within the lexicon. Therefore, RT should be longer with pictures than with words (presented auditorily or visually). Moreover, orthographic derivation from orally presented words -and articulatory derivation of visually presented words- would take longer than orthographic derivation from visually presented words and articulatory derivation from auditorily presented words respectively, because in the latter cases the input could directly activate appropriate representations in the lexicon.

(2) Frequency effects were predicted in oral as well as in written productions with words produced from pictures (for frequency effect in speech production see Beattie & Butterworth, 1979; Huttenlocher & Kubicek, 1983; Levelt, 1983; Jescheniak & Levelt, in press; Oldfield & Wingfield, 1965; Wingfield, 1968). Following the assumption that pictures cannot be *directly* encoded into linguistic format, and that the lexicon is necessarily accessed, a frequency effect should be observed. A frequency effect was also predicted with orally presented words produced in the written modality. This hypothesis conformed with the assumption of Véronis (1988). According to this author, an assembly process with heard words in writing, as shown by a simulation with French words, would result in one word out of two being misspelled (Catach, Gruaz & Duprez, 1986). Thus, in the latter case, an addressed process[6] should be involved and thus a frequency effect should emerge.

(3) The comparison between oral and written productions through the different kinds of input made it possible to test a phonological mediation hypothesis in writing. If phonological information is needed to retrieve orthographic information in writing, the RT difference between naming and writing with pictures should be greater than that observed between visually presented words produced in the written modality and orally presented words produced in the oral modality. In sum-

mary, a phonological mediation hypothesis in writing predicted an Output type X Mediation type interaction.

(4) Concerning the effect of regularity, two hypotheses were proposed. According to the first hypothesis, irregular graphemes in words (not predicted by their sounds) should necessitate a specific search in memory. Thus, a regularity effect should be observed with written words (low and high frequency words) produced from pictures and from orally presented words. The second hypothesis predicted that irregularity would interact with frequency: Low frequency irregular words would take longer to retrieve than high frequency regular and irregular words and also than low frequency regular words.

The experimental procedure asked careful preparation of the materials. The first section describes these preparations and the second one presents the main experiment.

2 PREPARATION OF THE MATERIALS

The goal of the preliminary session was to select a set of pictures that could be easily identified, commonly named and correctly spelled.

Method

Subjects
Twenty-eight subjects of the University of Burgundy participated in the preliminary experiment. The subjects were students of psychology (third year) and were native speakers of French.

Materials
Two hundred and two line drawings of concrete objects were selected from different picture books. Words associated with the pictures had a 5 to 89,209 frequency range. Frequencies were taken from Brulex (Content, Mousty & Radeau, 1990). These words differed in regularity and in the number of syllables. Word length varied from four to six letters.

Procedure
Subjects were tested collectively. They were given a booklet with the pictures and were asked: (1) to write down the name (without a definite or indefinite article) for each picture and (2) to check a box on a five level scale to indicate whether they identified the drawing of the picture very quickly, quickly, not really quickly, slowly or not at all.

Results
Eighty line drawings were selected. These pictures were easily recognized, commonly named and correctly spelled by 75% of the subjects. The verbal labels corresponding to the selected pictures were 40 monosyllabic and 40 bisyllabic words. Among these words ten were regular high frequency words (mean frequency (MF) = 3381 per 100M for monosyllabic words and 3804.5 for bisyllabic words); ten were irregular high frequency words (MF = 4162.6 for monosyllabic words and 3392.2 for bisyllabic words); ten were regular low frequency words (MF = 299.4 for monosyl-

labic words and 253.1 for bisyllabic words); and ten were irregular low frequency words (MF = 307.9 for monosyllabic words and 286.2 for bisyllabic words). The length of the words varied from four to five letters for monosyllabic words and from five to six letters for the bisyllabic words.

3 MAIN EXPERIMENT

In the experimental tasks, some subjects were asked to write down and others to say aloud words from pictures, from orally presented words and from visually presented words.

Method

Subjects
Twenty-one subjects (twenty female and one male) participated in the experiment. The subjects were students of psychology at the University of Burgundy and were native speakers and writers of French. They were randomly assigned either to the "Writing group" (nine subjects) or to the "Naming group" (twelve subjects).

Stimuli
- *Production (spoken / written) of words from pictures*
All stimuli were taken from the initial set of 202. The 80 pictures selected in the preliminary session were used as experimental pictures and a set of 120 pictures (taken from the original set) as filler items. Five blocks of 16 experimental pictures and 24 fillers were prepared.
- *Production (spoken / written) of words from orally presented words*
A set of 105 items was selected: 80 items were the experimental words, each one corresponding to the most common label given for every picture, and the remaining words were fillers. Items were recorded with a Mac Recorder. Five blocks of 16 experimental words and five fillers were compiled.
- *Production of words (spoken / written) from visually presented words*
As for heard words, 105 items were used. The items were grouped into five blocks of 16 experimental and five filler words.

Apparatus

The experiment was run on a Macintosh (Centris 650). A Wacom digitalizer and a microphone were used to record latencies (respectively writing latencies and naming latencies, also called RTs).

Procedure

Subjects participated individually in three different sessions. Each session took about 50 minutes. The order of succession of the experimental tasks was counterbalanced over subjects. Moreover, subjects were randomly assigned either to the "Naming group" (twelve subjects) or the "Writing group" (nine subjects). The basic experimental structure was the same for both groups.

PRINCIPAL TASKS

- *Producing words from pictures*
A trial consisted of a 150 ms presentation of a centered ready signal (a black point) followed by a picture. Subjects were asked to either quickly pronounce or write down the name associated with the picture. The next trial was initiated 5000 ms after the onset of the subject's response. A set of 18 practice trials was given before the experimental session.
- *Producing words from orally presented words*
The trials had the same structure as in the previously described task except that words were presented orally. Items were presented by means of headphones. Depending on the experimental group, subjects were asked to either pronounce or to write down each item heard. Ten practice trials were given at the beginning of the session.
- *Producing words from visually presented words*
The trials again had the same structure as described before, except that the words were presented visually centered on the screen. Depending on the group, subjects were asked either to pronounce or to write down each word. Ten practice trials were used.

Results

Analyses were restricted to the mono and bisyllabic five-letter words because otherwise the number of letters would not have been the same across conditions and thus could have potentially led to confusion.

Naming latencies
Trials were excluded from analyses when subjects produced items other than the expected ones, repaired their response, or produced mouth clicks. Overall, 3% of the observations were excluded from further analysis.

Written latencies
Observations were discarded from the analyses whenever any of the following conditions held: (i) subjects repaired response, (ii) words were misspelled, (iii) a technical problem occurred. On the basis of these criteria, 6.3 % of the data were excluded. Mean median reaction times were submitted to analyses of variance with both subjects and items as random factors. The Anova performed on subjects was a 2 (Output type: Naming vs Writing) X 3 (Mediation type: Nonlinguistic (Pictures); cross-linguistic modality (i.e. heard words written down and read words spoken aloud); same-linguistic modality (i.e. read words written down and heard words spoken aloud) X 2 (Number of syllables: one vs two syllables) X 3 (Frequency: Low vs High) X 2 (Regularity: Regular vs Irregular) with independent measures on the factor Output Type. In order to generalize the effects upon material, an Anova on items was performed with the same factors but the factors Mediation type and Output type were repeated while other factors were independent. The by-item analyses are reported only when a discrepancy is observed with the by-subject analyses. Significant planned comparisons are at least with p <.05.
   Descriptive results (mean medians and standard deviation) are presented in Table 2 and 3 and statistical results are presented in Table 1.

Table 1   *Main statistical results of main effects and interactions*

Main effects	F	df	p
Output type	71.4	1,19	.0001
Mediation type	106.45	2,38	.0001
Frequency	24.35	1,19	.0009
Regularity	6.96	1,19	.016
Syllable	9.48	1,19	.006

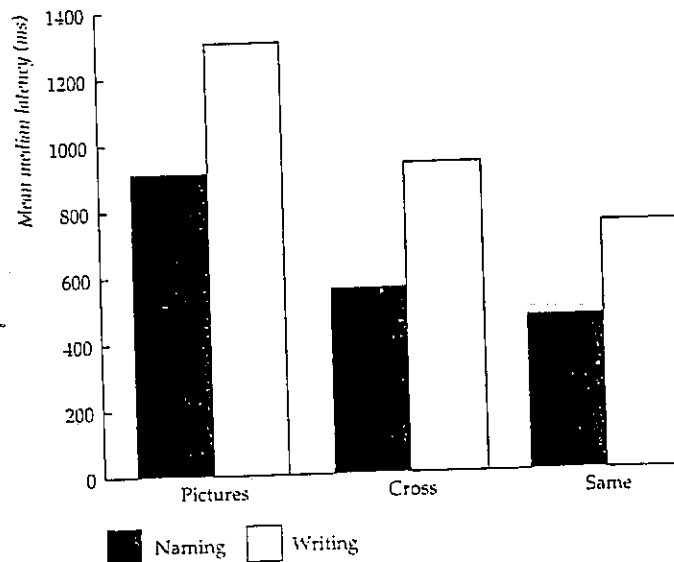| Interactions	F	df	p
Output X Frequency	9.69	1,19	.006
Mediation X Frequency	29.08	2,38	.0001

Table 2   *Mean medians (ms) and standard deviations (in brackets) for the Output type, Mediation type and Frequency factors*

Output Type	Naming	Writing	
	673 (228)	1084 (316)	

Mediation Type	Pictures	Cross-Modality	Same Modality
	1160 (309)	817 (253)	658 (231)

Frequency	High	Low
	857 (293)	906 (376)

Effects relative to Mediation type and Ouput type
The Output type was significant, with naming being 411 ms faster than writing, as was Mediation Type (cf. Tables 1 and 2). Planned comparisons performed on the main effect of Mediation type indicated that: 1) RT for Pictures was significantly longer than RT for Cross-linguistic modality and Same-linguistic modality; 2) RT for Cross-linguistic modality was significantly longer than RT for Same-linguistic modality. Output type X Mediation type interaction was not significant in the by-subject analysis and failed to reach significance in the by-item analysis [$F_1(2, 38) =$ $10.38 < 1$; $F_2(2, 64) = 2.57$, $p < .08$]. As illustrated by Figure 1, the mean difference between naming and writing is 437 ms with Pictures; 428 ms with Cross-linguistic modality and 367 ms with Same-linguistic modality. Planned comparisons showed significant differences between Naming and Writing across the different levels of the factor Mediation Type (Pictures, Cross-linguistic modality, Same-linguistic modality). Planned comparisons performed on the simple effect of Mediation type revealed that: 1) Pictures took significantly longer than Cross-linguistic modality and Same-linguistic modality in naming as well as in writing; 2) Cross-linguistic modality took significantly longer than Same-linguistic modality in naming as well as in writing.

Figure 1   Spoken and written latencies (ms) relative to the Mediation type factor

Frequency effects

Both the by-subject analysis and the by-item analysis revealed a main effect of Frequency (cf. Tables 1 and 2). Frequency X Output type and Frequency X Mediation type interactions turned out to be significant (see Table 1). The two-way "Frequency X Mediation Type X Output Type" interaction was not significant.

Planned comparisons indicated that the frequency effect was significant in writing from Pictures, from orally presented words and from visually presented words on the by-subject analysis only for this last comparison (see mean medians in Table 3 and Figure 2). In naming, the frequency effect (cf. Table 3 and Figure 2) was significant with Pictures on subjects, but marginally significant ($p < .08$) on items. Finally, the Frequency effect was not significant with visually presented words and significant in the opposite direction (RT for low frequency words < RT for high frequency words) on subjects only with auditory presented words (cf. mean medians in Table 3).

Regularity effects

The main effect of Regularity was significant in the by-subject analysis only. This factor interacted significantly with other factors. However, these interactions were only significant in the by-subject analysis. For that reason, they are not reported. Post-hoc comparisons indicated that the regularity effect was restricted to monosyllabic low frequency words produced from pictures.

Finally, the main effect of Syllable was significant in the by-subject analysis only. This factor interacted significantly with other factors but these interactions were only significant on subjects. For that reason, they are not reported.

Discussion

The purpose of the present study was to investigate how orthographic representations are computed during the written production of isolated words from different

Table 3   Mean medians (ms) and standard deviations per Output type, Mediation type, and Frequency of the words

Writing	Pictures	Cross-Modality	Same Modality
HF	1292 (221)	998 (158)	827 (159)
LF	1464 (339)	1064 (222)	856 (167)

Naming	Pictures	Cross-Modality	Same Modality
HF	890 (91)	603 (69)	496 (127)
LF	993 (163)	602 (72)	454 (119)

Note. HF: High Frequency words; LF: Low Frequency words

Figure 2   Spoken and written latencies (ms) relative to the Mediation type and the Frequency of the words
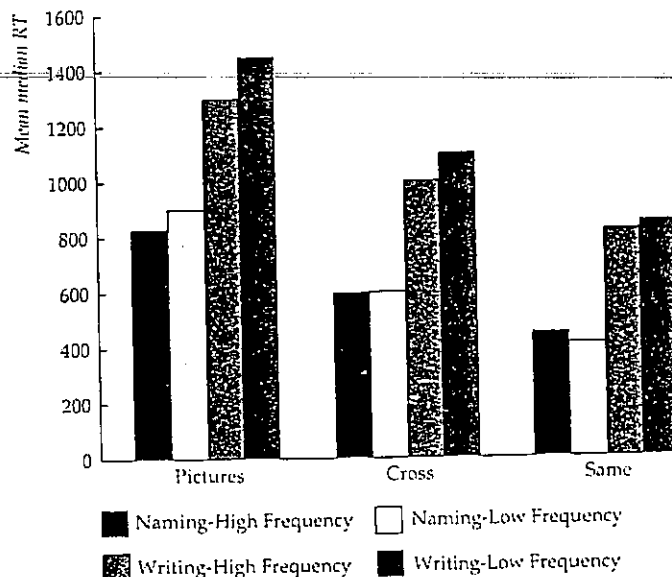
kinds of input (pictures, orally and visually presented words) in order to gain insight into the nature of the representations and into the processes involved.

As discussed in the introduction, results are in agreement with the assumption that pictures -contrary to linguistic input- have no *direct* connection to word representations within the mental lexicon. We assume, following Levelt (1989), that in order to retrieve the appropriate label associated with a picture, speakers and writers can bypass neither conceptual identification nor lemma access. For that reason, RT is longer with pictures than with words (heard or read), either written or spoken. In oral production, Fraisse (1967, 1969) had previously shown that RT was longer for the naming process (i.e. giving the verbal label of a picture) than for the reading process (i.e. reading the word associated with a picture). Fraisse concluded that this difference could be explained by the uncertainty of coding in the process of naming. Furthermore, the results are in accordance with the hypothesis that when

linguistic input can directly activate appropriate representations (relative to the output modality) within the lexicon, derivation is less costly than when a kind of transformation must be applied to the input (e.g. RT was shorter for visually presented words produced in the written modality than for orally presented words produced within the same output modality).

Following the assumption provided by Véronis (1988), it seems that orally presented words are not spelled via a nonlexical route. Evidence for this interpretation is the fact that a frequency effect was obtained in the writing task with words presented auditorily. Furthermore, this frequency effect cannot be due to acoustic physical differences: Linear correlation between acoustic physical duration of words and frequency turned out to be almost null ($r = .0054$). Concerning the frequency effect in naming and in writing from pictures, results were as expected. Yet, some results must be carefully examined: Firstly, no frequency effect appeared in naming neither on orally presented words (the effect was nevertheless significant on subjects) nor on visually presented words. How can we account for these null effects? It is always difficult to interpret null effects. A weak explanation relative to visually presented words named aloud could be that a nonlexical route was involved (i.e. a grapheme to phoneme conversion procedure was used). Concerning the null effect of frequency (i.e. the effect was not significant in the by-subject analysis *nor* in the by-item analysis) relative to orally presented words, the results are in accordance with the assumption of Connine, Mullenneix, Shernoff & Yelen (1990) that information derived from orally presented words could be directly used to produce an articulatory output. Secondly, the observed frequency effect with pictures was significant in the writing task with both random factors (subjects and items) but only marginally significant with items in the naming task. This last result could be due to the fact that some words are more frequent in oral production than in writing production. Such a hypothesis cannot be tested in so far as no oral frequency counts are available for French. Thus, the locus of the frequency effect observed in writing from pictures remains to be determined. For example, one could ask whether the frequency effect observed was due to identification processes. In oral production, Jescheniak and Levelt (in press) have shown that the frequency effect could not be attributed to identification processes.

Furthermore, two questions remain: (1) Could this frequency effect be related to lexical density[7]? In oral production, Jescheniak and Levelt (in press) have again demonstrated that the frequency effect was not related to lexical density. (2) Could the frequency effect be attributed to sublexical units as, for example, the frequency of initial bigrams? Two post-hoc analyses have been carried out: One related to the question of lexical density and the other related to the question of sublexical units. The first analysis showed that linear correlations between orthographic neighborhood density and written latencies obtained from the different kinds of writing tasks (from pictures, from heard words and for read words) were weak and non-significant (respectively: $rs = .01, .13, .14$). This suggests, then, that properties of a word form's lexical environment cannot account for frequency effects in writing. The second analysis revealed that linear correlations between initial bigram frequencies and written latencies were weak and most of the time not significant (writing words from pictures: $r = -.19$; writing words from heard words: $r = -.004$; writing words for read words: $r = -.20$). In conclusion, frequency effects in writing seem to be related either to lexical density nor to sublexical units.

The fact that the "Mediation type X Output type" interaction failed to reach sig-

nificance is not compatible with the hypothesis of a phonological mediation in writing. If phonological information was needed to retrieve orthographic information in writing, RT difference between naming and writing with pictures would have been significantly greater than that observed between visually presented words produced in the written modality and orally presented words produced in the oral modality. Our data and evidence presented in the introduction support the claim that anphonic mediation theory of spelling is not viable (Ellis, 1984). Consequently, the systematic latency difference observed between writing and naming through the different kinds of input could be attributed to differences relative to basic motor processes.

Finally, the regularity effect was weak. As expected, it was only observed in writing but restricted to monosyllabic low frequency words produced from pictures.

In conclusion, the experiment does not provide direct evidence as to the question of whether phonological information is retrieved during lexical access in writing, parallel to orthographic information. Nevertheless, this problem is currently under investigation.

APPENDIX

List of names of experimental pictures used and analyzed in the main experiment. The English translation is given in brackets.

High frequency regular names (one syllable):
   tasse (cup), ongle (nail), vache (cow), plume (feather), botte (boot)
High frequency irregular names (one syllable):
   noeud (knot), tronc (trunc), queue (tail), poing (fist), croix (cross)
Low frequency regular names (one syllable):
   zèbre (zebra), cible (target), toque (cap), crabe (crab), loupe (lens)
Low frequency irregular names (one syllable):
   hotte (basket), bouée (buoy), gland (acorn), clown (clown), harpe (harp)
High frequency regular names (two syllables):
   lapin (rabbit), piano (piano), avion (plane), canon (cannon), nuage (cloud)
High frequency irregular names (two syllables):
   sabot (clog), wagon (wagon), tapis (carpet), fusil (gun), fumée (smoke)
Low frequency regular names (two syllables):
   écrou (nut), micro (microphone), évier (sink), patin (skate), stylo (pen)
Low frequency irregular names (two syllables):
   robot (robot), momie (mummy), capot (hood), radis (radish), béret (beret).

NOTES

1   A lemma is an abstract lexical entry that captures semantic and syntactic aspects of words (e.g., gender, grammatical class). The distinction between lemma and phonological form is now widely accepted (Jescheniak & Levelt, in press).
2   Harley (1993) showed by means of simulations that retrieval of semantic information could precede retrieval of phonological information inside an interactive architecture.
3   The example given is taken from Ellis (1984).
4   According to Luria (1970) "... the flow of speech is broken down into individual sounds. The phonemic significance of these sounds is identified and the phonemes represented by letters. Finally, the individual letters are integrated to produce the written word." (p. 323-324).
5   "(...) information about pronunciation is more readily available than semantic information. For pictures, accessing the verbal name code occurs relatively late compared to access of meaning." (Smith & Magee, 1980, p. 390).

6 Following Ellis (1984), addressed spellings refer to processes by which spellings are retrieved from a long-term store of learned spelling.

7 Andrews (1989) showed in a naming task that RT for visually presented words was shorter for low frequency words with many orthographic neighbors than for low frequency words with few orthographic neighbors (but see also Grainger, O'Regan, Jacobs & Segui, 1989; Segui & Grainger, 1992).

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