A Temporal Analysis of Formulation Processes in L1 and L2 Writing

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This cross-sectional study used verbal protocol analysis to compare the temporal distribution of formulation processes of Spanish EFL writers composing L1 and L2 argumentative texts. We studied three groups at different levels of L2 proficiency. Results showed the same total formulation time regardless of whether participants wrote in L1 or L2. L2 proficiency, however, affected times. Higher-proficiency participants devoted less time to formulation, concentrated formulation in the central stages of composing, and increased the interaction between formulation and other subprocesses. Fluent formulation was twice as common as problem-solving formulation when writing in L2 and five times as common in L1; these ratios appeared to be invariant across proficiency. Theoretical and methodological implications for the study of L2 writing processes are discussed.

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Studies in L2 composition have systematically adopted theoretical and experimental models developed to describe composing in the writer’s first language, the rationale being that it seemed intuitively sound to examine the processes involved in text production, regardless of specific linguistic problems, and then to apply that knowledge to L2 research (Grabe & Kaplan, 1996; Krapels, 1990). Whalen (1993) has identified some common elements shared by these models—basically those developed by Flower and Hayes (1981), de Beaugrande (1984), and Bereiter and Scardamalia (1987). In the first place, they adopt a “process approach” to the description of text production, which emphasizes its dynamic character by assuming that several subprocesses—planning, formulation, and revision—interact with one another in a recursive fashion. The second characteristic of these models is their definition of the writing task as a complex, problem-solving process whereby writers are assumed to manipulate those processes and their corresponding mental representations to achieve the goals they set for themselves. Mental representations in composition range from those related to content and lexis to those of a syntactic, discourse, or rhetorical nature, all of which may give rise to a wide variety of problem spaces. Finally, the selection and execution of composition processes through this variety of problem spaces is carried out under the constraints of a monitor, which controls the whole process. This third component of the above-mentioned composition models enables the writer to make decisions such as the precise moment at which a certain subprocess can be brought to a halt, when a partial revision is required because a mismatch has been identified, whether objectives are to be reformulated, and so on. To make these decisions, the writer has to gain access to relevant knowledge, process it in the context of the task at hand, and store the intermediate mental products through the use of working memory (Kellogg, 1999).

One approach commonly taken in L1 research (Hayes, 1996) to account for the way working memory functions in writing is Baddeley’s model (Gathercole & Baddeley, 1993). According to this framework, working memory includes a central executive¹ which,
because of its limited capacity, coordinates cognitive processes through scheduling and attentional control, that is, by activating certain processes and inhibiting others. If composition processes—and their corresponding subprocesses—all draw on the central executive (Kellogg, 1996), then tradeoffs across processes may occur. In fact, research into L1 writing processes has produced cases where planning was disrupted by spelling (Graham, 1990), where idea generation interfered with handwriting among children (Bourdin & Fayol, 1994), and where, on a persuasive task, the number of generated ideas systematically decreased as constraints increased from an unordered proposition condition to a polished sentence condition (Glynn, Britton, Muth, & Dogan, 1982). This all seems to indicate that basic composition processes—planning, formulation, and revision—are resource-limited with regard to executive functions (Kellogg, 1999).

The composing models mentioned above reflect a conception of writing as a controlled, rational process where writing skill is a question of working out what one wants to achieve with the text and then deciding how to do it step by step. It is, thus, a top-down account of writing, whereby thoughts are separated from their translation into words rather than being seen as part of text production. The consequence has been that formulation has received scant attention compared with the other macroprocesses, planning and revision (Faigley, Cherry, Joliffe, & Skinner, 1985; Fayol, 1991; Humes, 1983; McCutchen, 1984, 1995; Piolat & Roussey, 1996; Scardamalia & Bereiter, 1986; Witte & Cherry, 1986). In these models, the very use of the term “translating” seems to associate formulation with the process of matching a set of conceptual elements organized as propositions to sequences of syntactically organized linguistic units. No reference is made to the complexity of operations involved. Yet formulation basically entails both (a) the conjugation of goals and ideas—understood as hierarchically organized sets of options not necessarily associated with particular language representations—with the constraints of syntax and lexis (Fayol, 1991) and (b) the relationship between
the production of sentences and their integration into a textual framework (Roca, Murphy, & Manchón, 1999).

This lack of attention to formulation is regrettable, because it is reasonable to assume that the locus in which L2 writing may largely reveal its own specificity, in contrast with L1 writing, is that in which the writer tries to translate an idea, which may be organized in a complex network of relationships, into a linear piece of written language. However, in search of this specificity some studies in L2 writing process research have created useful categories to account for the problematic nature of formulation as a side effect of their otherwise global concerns with the composing process (Arndt, 1987; Bosher, 1998; Cumming, 1989; Raimes, 1985, 1987; Uzawa, 1996; Whalen, 1993) or have looked at formulation from the perspective of fluency (Brooks, 1985; Sasaki, 2000; Sasaki & Hirose, 1996; Victori, 1995).

From the first of these angles, the writer’s need to compensate for a lack of linguistic knowledge is reflected in the number of strategies reported that could be regarded as examples of communication strategies, e.g., rehearsing for compensatory reasons (Arndt, 1987; Raimes, 1985, 1987), translating (Cumming, 1989; Swain & Lapkin, 1995; Whalen, 1993; Whalen & Ménard, 1995), generating and assessing lexical alternatives (Bosher, 1998; Cumming, 1989; Krings, 1994; Swain & Lapkin, 1995; Zimmermann, 2000), or feeling for the language through sound and sense (Swain & Lapkin, 1995). The need to generate ideas in order to progress through the text is seen in Raimes’ (1985) notion of rehearsal and in idea-generation processes (Whalen, 1993). Some studies even mention the need to abide by criteria of formality, genre, relevance, or coherence, e.g., Raimes’ (1987) third function of rehearsal, relating parts to the whole, and setting or adhering to a goal (Cumming, 1989), rhetorical refining (Sasaki, 2000), and the writer’s drive to keep up the standards of her L2 production (Uzawa & Cumming, 1989). The main drawback to all these categories, however, is that they were not originally designed for looking specifically at the process of putting words into linear form and so can be seen as weak from the explanatory point of view,
because “they trade generality for power” (Newell, 1980, p. 186). Besides, they are mostly lexically oriented, pay little attention to syntactic processes, and are mainly focused on the lack of availability or lack of access to L2 knowledge, with little concern for the multiplicity of ideational and discourse concerns that also guide writers in their search for words and structures.

Moreover, the application of some of these categories in research has produced contradictions. For example, rehearsing has been assigned a totally different status in L2 composing by Arndt (1987) and Raimes (1987). Although for Arndt (1987, p. 265) writers were deterred from rehearsing because they felt “less able to try out alternatives and less happy with their decisions in L2 than in L1,” Raimes (1987) reported that the L2 condition seemed to prompt more rehearsing, because ESL writers seemed to be less inhibited by an excessive concern with accuracy than their L1 counterparts. In the same vein, the second language does not seem to impose a similar saliency effect (see Bereiter & Scardamalia, 1987) across different studies. Although Whalen and Ménard’s (1995) writers were reported to concentrate on morphemic considerations in their L2 task at the expense of searching for appropriate words and structures, as in their L1 writing, Uzawa (1996) found that her writers paid similar attention to the various linguistic aspects of their writing across languages. The usefulness of translation is a further case of a factor that does not seem to be equally applicable to equivalent populations. Though reported as beneficial for lower-proficiency writers (Kobayashi & Rinnert, 1992), it also seems to slow down their writing process, block their generation of ideas, and distract their attention from higher levels of discourse (Whalen & Ménard, 1995).

Inconsistencies may also be found when formulation has been analyzed from the second perspective: that of fluency. Some studies report that skilled writers write longer texts than their unskilled counterparts, who have been found to keep their texts brief from lack of interest or fear that they would be full of errors (Brooks, 1985), or, alternatively, because they reported making use of more mental translation (Sasaki, 2000; Sasaki & Hirose, 1996).
Other studies, however, have found that both groups of writers wrote a similar number of words, suggesting, as opposed to the previous studies, that the possibility of making errors is not stigmatizing for L2 writers (Raimes, 1987; Victori, 1995). Equally ambiguous are the results of those studies in which fluency has been seen in terms of the number and length of pauses. Although Sasaki and Hirose’s (1996) skilled and unskilled writers both reported that they stopped on encountering a problem, Victori (1995) found that her skilled writers paused longer and wrote sentences in shorter chunks than her unskilled counterparts.

Finally, problematic and fluent formulation processes have been analyzed in conjunction. Even here, however, some inconsistencies may be detected in the way the interruption of transcription by other processes has been interpreted. Researchers such as Bosher (1998), Cumming (1989), Swain & Lapkin (1995), and Victori (1995) have interpreted this decrease in fluency as the price skilled writers have to pay for planning, evaluation, and reprocessing their ideas on-line. Interruptions were thus seen as a reflection of writing ability: The larger the number and the wider the variety of interspersed processes, the more skilled the writing behavior is taken to be, because it is a direct reflection of the problem-solving approach adopted by the writer. In contrast, research comparing L1 and L2 writing processes has reported that the fragmentation of second-language transcription just reflects that these processes are harder to sustain and less efficient (Ransdell & Levy, 1998; Sasaki & Hirose, 1996; Silva, 1993), which may have obvious consequences for the fragmentation of thought. Seen from this angle, second-language writers run the risk of overloading their working memory with linguistic concerns so that the coding of ideas and all related issues—association, elaboration, chunking—are constrained (Kobayashi & Rinnert, 1992; Pennington & So, 1993; Yau, 1991).

All these contradictions and inconsistencies point to the need for a more refined approach that will enable us to look more closely at how writers manage the tradeoff between fluent transcription and the range of problems they have to solve on-line in both their
L1 and their L2. It is our belief that such an approach can be found in studying the allocation of processing time. This has been proposed (Kellogg, 1987, 1988, 1996; Rijlaarsdam & van den Bergh, 1996) as an appropriate method to look into the working of the monitor from the perspective of the competition for resources in working memory during composing.

At least two consequences deriving from the time-based nature of the composing process can be posited. First, certain processes will predominate at particular stages of writing at the expense of others. Moreover, a process probably cannot be interpreted in the same way, nor will it have the same effect on the quality of the final product, if it occurs at one stage rather than another. The second consequence is that the duration and organization of the processes in time may vary from one writer to another and among groups. These differences in distribution may signal differences in the temporal organization of the processes and thus in the different purposes associated with them (Rijlaarsdam & van den Bergh, 1996). The analysis of these aspects may help us to better understand how writers adapt to the formulation task. We may expect differences in the temporal allocation of resources, depending on the participants’ L2 proficiency level. For example, selective attention to certain formulation processes may be a typical feature of proficient writers but not of less proficient ones. Similarly, writers will differ in the way they adapt their time allocation to formulation processes as a result of task conditions. Although some writers may have more than one configuration of processes to fulfil different task requirements, others will stick to one routine regardless of the assignment.

An unanswered question in SLA research is how the writer handles formulation in terms of time. We assume here that time is a proxy variable that reflects the writer’s approach to the changing task situation. Bearing this in mind, the basic aim of our study has been to discover to what extent L2 proficiency and the language of the task assignment (L1 or L2) affect the time allocated to formulation processes and their distribution throughout the composing process. More specifically, we are interested in
finding out to what extent the changes in the probability of occurrence of formulation (and its corresponding subprocesses), as a result of changing task situations from the start of the writing process, are a function of the writer’s command of the L2 and the supposedly different types of demands involved in L1 and L2 composing tasks (Devine, Railey, & Boshoff, 1993; Leki, 1992; Silva, 1993; Whalen & Menard, 1995; Yau, 1991). Such an analysis could yield important insights into at least two areas where numerous open questions still exist: the alleged specificity of L2 composing (Silva, 1993; Whalen & Menard, 1995; Yau, 1991) and the possible developmental paths writers move along in the acquisition of the different components involved in their competence as formulators in a second language.

Method

Participants

Because one of the independent variables of the study was L2 proficiency, we had to collect data from L2 learners at different stages in their language-learning process. So we decided to collect data from EFL learners at three levels in the Spanish educational system. School level served as a first rough guide to exposure to the L2 and thus as an initial indicator of different proficiency levels. We then assessed L2 competence more finely by administering a standardized proficiency test. Informants for the study were seven high school pupils (HS group henceforth), seven university students studying Education (SE group), and seven recent graduates in English (Ph group). All were native speakers of Spanish. The secondary school students were in their third year of BUP (Bachillerato Unificado Polivalente) at the Instituto de Floridablanca, Murcia. They were in their sixth year of learning English at school, and their ages varied from 16 to 17. The Education students were finishing the second year of a three-year course in the Department of Education at the University of Murcia.
leading to the Diplomatura en Magisterio. They were in their ninth year of learning English, and their ages varied from 19 to 20. The third group had completed their five-year degree in the Department of English at the University of Murcia nine months prior to their participation in the study. They had been studying English for the previous twelve years and were now preparing for competitive state examinations as EFL teachers and/or doing professional training. Their ages ranged from 23 to 24. The groups were not controlled for gender, because this was not a factor in the design of the study. The HS group was composed of four males and three females. The SE group consisted of seven females, whereas in the Ph group there were six females and one male.

The informants in each group were selected on the basis of their scores on the Oxford Placement Test (OPT henceforth) (Allen, 1985). This test assesses discrimination in listening, reading, and grammar. There are two sections on the test which together produce a total score of 200. According to the author, very high correlations have been established between OPT scores and scores on much more complex test batteries. To facilitate comparisons, the author relates scores to a variety of external norms. For instance, a result around 110 is described as being that of an “elementary: limited user,” whereas a score around 140 is described as that of a “mid-intermediate: independent user,” roughly equivalent to Level 5 on the British Council IELTS test or a low pass on the University of Cambridge First Certificate Examination. A score of around 180 is said to be that of a “very advanced: highly proficient user” and is compared to level 8 on the IELTS test and an A pass on the University of Cambridge Proficiency Examination. The range of scores for the HS group in our study was between 100 and 108; that of the SE group was between 140 and 157; the Ph group’s scores ranged from 174 to 190. An ANOVA test was carried out on the three sets of marks, and the differences between the three groups were found to be significant \( F(2, 18) = 397.227, p < 0.000 \).

In the case of the HS and SE groups, who were still in full-time education, the informants were selected from their year
group on the basis of their scores on the OPT, which was administered by their class teacher or tutor. However, in the case of the Ph group, who had already graduated from university, it was decided to approach individually a number of students judged by their former English language teacher to be at the approximate level of proficiency required. They were asked to participate in the selection test and, if selected, in the study. All but one out of thirteen agreed to participate. When they subsequently took the test, all twelve fell within the required score range, and seven were then chosen at random as informants for the study.

A questionnaire adapted from Porte (1995) was administered to the informants in order to collect information about any prior writing instruction, their personal writing experience, their perceptions as writers, problems they experience, and procedures that they use. According to the information provided in the questionnaire, none of the participants from any level had taken specific courses in L1 writing. Some students reported that their experience in L1 writing was limited to text commentaries and the type of writing involved in the content of the different school subjects. Lack of explicit training was also reported for L2 writing, although, in this case, some members of the SE group reported that their teachers had sporadically commented about the importance of organization in English compositions. In this respect, the members of the Ph group stated that they had been given some hints about the structure of paragraphs in English, the need to write short, clear and concise sentences, and the use of appropriate linking words. As for the text types practiced, all had practiced essay and summary writing to a greater or lesser extent in their English language classes at school and university. The advanced group had had greater contact with English in the final three years of their degree course, since from that point on, it is policy in the English Department to deliver all lectures in English. These advanced students had also had practice in writing essays in English on content subjects, because this was a requirement for many of their undergraduate courses.
Tasks and Procedures

We obtained data for the study by analyzing the participants’ think-aloud protocols while they performed the following two writing tasks:

**L2 task.** Success in education is influenced more by the student’s home life and training as a child than by the quality and effectiveness of the educational program. Do you agree or disagree? (taken from Raimes, 1987)

**L1 task.** El fracaso escolar se debe más a la falta de responsabilidad del profesor en el cumplimiento de sus deberes como enseñante que a la actitud, esfuerzo, aptitudes, motivación por parte de los alumnos. ¿Estás de acuerdo o en desacuerdo?4

The similarity of topics—both dealing with educational issues thought to be familiar to the students—was based on the research evidence that very different topics might affect the quality and quantity of writing (Hamp-Lyons, 1990; Reid, 1990; Sasaki & Hirose, 1996; but see, for example, Whalen & Ménard, 1995, for arguments against this procedure). The argumentative nature of both tasks represents the typical academic assignment that students have to carry out in ordinary language classes. It is a demanding text type, requiring an awareness of formal register, an ability to manipulate abstract concepts, and familiarity with the rhetorical conventions of presenting arguments, although it also allows the writer to bring in personal attitudes and experience.

During the composing sessions, all the informants in each group were concurrently tape-recorded in language laboratory booths at the Faculty of Education, University of Murcia. The decision to record a whole group at a time was made partly because of time and human resource limitations, given the relatively large number of students to be recorded on two tasks, and partly because of the impossibility of preventing communication among participants about the assignments if they were recorded one by one. A further advantage of this type of recording session is that it helps to “neutralize variations in data due to cultural and gender-related interactions between researcher and subject” (Smagorinsky, 1994,
Before the first session, the students were briefly instructed to verbalize all thinking while composing in any language of their choice and then given the opportunity to practice the think-aloud method with a mock composition (“Advantages and disadvantages of . . . ”). No modeling of the think-aloud method was provided, in order to avoid the potential danger of the students restricting their “thoughts” to the type they had seen modeled (Smith, 1994). In addition, because it was essential for our research aim to let our students use the language they would feel more comfortable with for their verbalizations, modeling the think-aloud technique might have influenced the participants’ choice of language. Once the experimenter was satisfied that the students had grasped the technique (after about 15 to 20 minutes), the students were stopped, informed about technicalities (for instance, how to change the cassette over), asked to voice any problems or need for clarification, and told that they were not to talk to one another, that they could not use dictionaries and should not ask for help (Smith, 1994; Swain & Lapkin, 1995). This decision was made because of the researchers’ interest in the writers’ handling of formulation problems that must involve, among other things, the use of different search strategies without external feedback. Participants were then given a 60-minute cassette and told that they had an hour to complete their task. The two researchers who remained present during the sessions did not intervene or listen in to students thereafter in case it interfered with the informants’ cognitive processes (Krings, 1987).

Whilst recognizing that the ideal procedure would be to control for task order by administering the assignments alternately, this was not feasible because the informants, who belonged to same-year groups and were in constant contact with one another, could disclose the tasks to one another after each session. Therefore, the order of the assignments was held constant across the three groups: the L2 task before the L1 one. Although it must be conceded that this lack of counterbalancing could have produced some task effect, the procedure also provides some advantages. It avoided translation and the transfer of ideas and
strategies that might have occurred more naturally if moving from the L1 to the L2 task (Whalen & Ménard, 1995). In addition, one week was allowed to elapse between the completion of the English task and the Spanish task.

Upon completion of both tasks, participants were given two follow-up questionnaires, based on Hall (1987) and Perl (1979), to find out about their attitudes toward the writing environment, among other things. Responses to the questionnaires revealed that, although all 21 participants were able to think aloud and none of them was blocked by the difficulty of speaking and writing at the same time, some variation among informants could be detected. Across groups, thirteen participants reported not having experienced any difficulty while speaking and writing at the same time in either task. In contrast, three students (two from the HS group and one from the Ph Group) claimed some difficulties with the TA in both tasks. Finally, five participants commented that they had experienced difficulties in one task, either L1 or L2, but not the other. The resulting audio recordings were later transcribed and, together with the actual compositions and any notes written, were subjected to protocol analysis.

As these data show, the use of the think-aloud technique has its problems. Some researchers have expressed doubts as to whether it distorts writers’ normal composing processes (Faigley & Witte, 1981; Sasaki, 2000), and others have even reported that the method appeared to have affected the quality and content of participants’ cognitive activities when writing (Stratman & Hamp-Lyons, 1994). However, Ericsson and Simon (1993), in their well-known review of the method, found no evidence that thinking aloud changed the course or the structure of the task being studied. Ransdell (1995) lent support to Ericsson and Simon’s claims, finding that there was an effect for the method on the rate but not on the nature of the processes involved. Finally, Jansen, van Waes, and van den Bergh (1996), in spite of having found evidence that distortion of processes might vary depending on the nature of the task, endorsed the think-aloud method because of the richness of data it produces.
The Coding Scheme

To answer our research question, we had to make a series of methodological decisions in order to develop a suitable coding scheme. Because what interested us was precisely the kind of operations that make sentence production and the integration of sentences into a text structure possible (Berninger, 1995), we had two types of problems to contend with: (a) establishing criteria that would allow us to distinguish formulation from those processes that because of their complexity could be confused with it—planning and revision; and (b) analyzing the different manifestations of formulation in the protocols so as to develop coding categories that would identify the different behaviors involved in this process as exhaustively as possible.

The shaping of the coding scheme required a number of passes through the protocols, which involved a series of tests and revisions of the data until no more changes were required (Kasper, 1998). Initially we could only segment the protocols into easily identifiable episodes (reading of the assignment, task interpretation, rereading the text produced so far, evaluation, and meta-comments), alternating with other episodes that had boundaries that were not so clear (planning, formulation, and revision). In the second stage of the analysis, the criteria for segmenting planning from formulation and revision were established. In the final stage, once the lines had been drawn between these macroprocesses, the detailed analysis of formulation began. In this respect, the guiding notion of problem solving and the segmentation procedures used were crucial. What follows is a detailed account of the coding categories that we identified and the segmentation procedures that we used in the last two stages.

Distinction between planning and formulation. A careful analysis of the protocols led us to assume that planning covered all those segments that indicated operations involving the retrieval and/or development of ideas, aims, organization, etc. at a prelinear level. Formulation, on the other hand, was taken to cover both the verbalization of written material and those other
utterances that, because of their strict linear nature (lexical units, syntactic structures, etc.), could be considered clear candidates for becoming part of the text. These alternatives are known as “pre-texts” and are tentative formulations varying in length from a complete sentence to a single word (Witte, 1987). Following the literature (Camps, 1994; Kellogg, 1996), we considered the decision-making process in planning independently of linguistic structures because of its global nature, whereas the pre-texts and written texts, which revealed how writers converted ideas and goals at lower levels of abstraction into specific linguistic forms, were both considered aspects of formulation. The difference between planning an idea, its formulation as a pre-text, and its final conversion into written text can be seen in the following example:

Global plan: education is important (written note)

↓

Pre-text: “. . . I mean that on that basis . . . I know I'm convinced that education can change . . . um . . . can make children able to develop . . . in spite of their family atmosphere . . . that's why I want to be a teacher . . .”

↓

Written text: “On that basis I'm sure children can be encouraged to learn and develop their skills by teachers although their homelife doesn’t contribute to their education.”

Distinction between formulation and revision processes. Drawing a line between formulation and revision was not an easy task. Not only was there the fact that both processes frequently deal with the same types of problem, which might cloud the possibility of establishing clear criteria to distinguish them, but also the added difficulty arising from cognitive studies on composing, which suggest that writers revise not only the sentences they have already written, but also the unwritten or only partially written text (Witte, 1985). This broadening of the field of revision strategies led us to analyze some on-line revision studies in search
of more reliable criteria. We found that one of the variables normally used in this type of study as a basic criterion to establish a clear operational distinction between formulation and revision was distance from the point where the modification of the text took place to the point of inscription (Lutz, 1987; Matsuhashi, 1987; Severinson Eklundh & Kollberg, 1996). The changes that took place within the sentence being written at that moment (coded as “repairs”) were included in formulation, whereas those that dealt with any sentence prior to the current one were identified as belonging to the revision process.5

Coding of the formulation process. The first analysis of the protocols showed that, by and large, the participants used two main types of behavior when formulating: At times, the process went more or less fluently, whereas at others, the writers clearly stopped to tackle particular problems.

Fluent formulation processes. A closer analysis revealed that the fluent fragments always included transcribing (or writing as such) as an indispensable process, rereadings and short pauses appearing as options. Following Perl (1979), we interpreted these rereadings and pauses as platforms that the informants used to continue generating text. Further analyses revealed that on-line repair of the text—as indicated above—and binary operations (see below) could also be included in this way of formulating. In line with this, we decided to consider as “fluent” formulation segments those that, though not purely automatic (McCutchen, 1995), show that the writer progresses through the text without having to tackle problems, at least explicitly. Apart from the short pauses that occasionally appear between rereadings and writing proper, fluent formulation includes the following categories:

(Underlined segments represent text actually written down; italics represent rereadings and repetitions; figures in brackets represent pauses in seconds, although pauses of less than three seconds are shown by dots.)
Writing. Writing down the different linguistic units.

“... on the other hand I have examples of children that the positive or negative influences...” (SE7, L2).

Repairs. These are the immediate modifications introduced into the text “on-line” and within the boundaries of the current sentence. Repairs can be of a compensatory or ideational/textual nature.

Example of repair with a compensatory purpose:

“... can be determined for them a lot a causa de ellos for them by them (the writer replaces “for” with “by”)...” (SE7, L2).

Example of repair with an ideational/textual purpose:

“... many problems can influence life many problems related to homelife (the writer inserts “related to homelife” between “problems” and “can”) can influence life ...” (HS3, L2).

Binary or simple formulations. Those segments in which the writer moves straight from formulating a pre-text to putting it down on paper. Most instances correspond to the following pattern: pre-text → implicit or explicit evaluation → solution. This group of subprocesses coincides with a group of similar categories developed by Cumming (1989) and Swain and Lapkin (1995). The range of binary formulations is very broad, ranging from morphological decisions...

“... children in his in their first stage...” (HS2, L2).

... to immediate translations...

“... un mal profesor a bad teacher...” (HS4, L2).

“... tienen mucha responsabilidad have a lot of responsibility...” (HS4, L2).

... to ideational/textual modifications...

“... how analyze ... no no why analyze why analyze these influences...” (SE7, L2).
Problem-solving formulation processes. Our review of the relevant literature (see the introduction section) revealed that most studies lacked explicit segmentation criteria, probably having lacked a clear theoretical framework from which to develop the categories (Manchón, 1997). In fact, the studies refer to their units of analysis as “writing behaviors” (Raimes, 1987), “composing activities” (Arndt, 1987), “utterances” (Whalen, 1993), or “episodes” (Swain & Lapkin, 1995).

An alternative to those procedures involved the use of a theoretical system as a frame of reference for our decisions. We found it in a serious consideration of the notion of problem-space (Newell, 1980). This line of research conceives of problem-solving as the sequence of operations that proceed from the initial state (the way the writer represents the problem to him/herself) to a goal state (the solution to the problem). In line with this definition, we considered that there was a formulation problem when the protocols indicated the existence of a gap (of various types and at a variety of levels) between an intended meaning (already constructed or in the process of construction) and the lexical units and syntactic structures needed to express it. For example, restructuring problems (see below) were operationalized as consisting of an initial syntactic plan plus a sequence of operations (rereading, pauses, repairs, pre-texts, evaluations, etc.) leading to the production of one or more alternative plans. By way of illustration and for clarity (see Table 1), we have broken up an example of restructuring into its different steps (Roca et al., 1999).

In accordance with this theoretical frame, segmentation in our data was carried out by using different criteria that gave the coder the possibility of increasing the validity of the analysis even at the expense of reliability. Segmentation was carried out in our corpus by considering the writer’s verbalizations of goals. These verbalizations showed that writers tended to explicitly signal the initial state of the problem space by a variety of means: candidate formulations (“what is the right word, help or helping?”), explicit problem indications (“I don’t know how to write this”), metalinguistic statements (“how could I introduce the issue of teachers..."
and students . . . ?”), evaluations at different levels (“the issue of the environment is not suitable here . . . I’ve just talked about it”), those repairs that prompt a search episode, etc. When coding, we took these protocol segments to indicate the nature of the problem the writer might be experiencing (language, gist, discourse, etc.) and also as a clue to the identification of the strategies used to solve it. Search procedures in a particular problem-space were taken to have ended when the writer either produced a string of written text, postponed the solution, or gave up on a problem. Unlike the categories describing “fluent” formulation (see above), which we coded separately, problem-solving processes were considered as categories in themselves and coded as such. In other words, each individual problem-space was coded as a unit, regardless of the number and quality of behaviors (pre-texts, evaluations, rereadings, pauses, etc.) interspersed between the initial and the final state.

The application of these criteria allowed us to identify two main types of problem-spaces in the formulation process: lexical searches and restructuring. In both cases, their activation was

Table 1

An example of problem-solving behavior (restructuring) in formulation

| I felt very bad in the school and and and on the other hand | 1 | (1) already written text |
| (4) I no ay no esto no | 2 | (a) initial syntactic plan |
| además ¿como puedo poner esto? me sentía muy mal en la escuela | 3 | pause + false start (pretext) |
| (5) in Esto no fuera (repair) | 4 | negative evaluation of (unspoken) formulation |
| In general I have very bad remind | 5 | problem indicator |
| (b) writes the alternative plan | 6 | rereading of (1) in L1 |
| (7) in Pause + false start (pretext) | 8 | decision to repair and restructure; deletes “on the other hand” |

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found to serve two possible purposes: compensatory or ideational/textual.

**Lexical searches.** This category includes all those searches for words and expressions needed to express the message clearly and appropriately. To avoid confusion with the production of potential syntactic alternatives, it has been assumed that this process is activated once the writer has decided on the syntactic structure—at least up to the point at which the lexical search takes place.

Example of compensatory search:

"...a more delicate teaching that is (4) proporcionada... otorgada... impartida (3) que tiene lugar... that has placed through the educational program..." (SE1, L2)

Example of ideational/textual search:

"...now nevertheless... did I say nevertheless up above? I think I’ve put nevertheless somewhere now first page... no not here... I’ve got almost... of course... so where’s my nevertheless? ah¡ yes in the introduction... now what can I say instead of nevertheless? yet no... I don’t like yet here at the beginning of a sentence... however however my interest in... (Ph3, L2).

**Restructuring.** This is the search for an alternative syntactic plan once the writer predicts or anticipates that the original plan is not going to be satisfactory for a variety of linguistic, ideational, or textual reasons (Roca et al., 1999). The alternative plan may be totally new or be produced by manipulating sentence constituents or by selecting and integrating or otherwise paraphrasing elements from previously generated structures in the L1 or L2.

Examples of restructuring with a compensatory purpose:

"...if the members of their homes don’t pay attention to them... pay attention to them (3) they aren’t... vamos que les da igual el colegio... pero es que... ¿cómo puedo poner yo eso? les da igual...if the members of their homes don’t pay attention to them... they... que les da igual pero yo no sé cómo se escribe que les da igual...if the members of their homes don’t pay attention to them they do all they want..." (SE3, L2).
Examples of restructuring with an ideational/textual purpose:

* because it's not true (5") no it’s not true no porque no aclara
  lo que quiero decir . . . estoy tachando it's not true (3") ay
  ya se me ha olvidado otra vez is bad or not important
  because it can improve many skills in children . . .” (SE7,
  L2).

Once we had decided on the categories, we carried out a reliability test. Prior to this test, two of our team separately coded five protocols for each behavior, as a trial run. Problem codings were then discussed until agreement was reached and the researchers were satisfied that the categories fitted the data. Then, three protocols were used for the reliability test. They were coded by the same researchers, and reliability was established (76% agreement over 797 coding decisions) with a randomly selected 14% (i.e., three) of the protocols.

Composition time was operationalized by measuring each individual category described above in seconds and adding up the total amount of time for all of them. For the statistical calculations we decided to use the time spent on the different episodes of formulation as percentages of total composition time rather than using the raw time totals. Using raw time scores might have given the impression that high verbalizers were also high formulators, which was not necessarily the case. Rijlaarsdam and van den Bergh (1996) contend that percentages are fairer than total frequencies, because the differences among writers are expressed as the relative contribution of each process regardless of the variability across informants in terms of quantity of processes verbalized and time on task. Finally, we operationalized the temporal distribution of formulation throughout the whole composition process by dividing the total amount of time for each composition into three equal periods. This would enable us to analyze how much time our writers devoted to formulation at the beginning, middle, and end stages of their individual composing process.
Results

Two main types of formulation process were considered for an ANOVA analysis: formulation processes involving problem-solving (FPS+) and formulation processes not involving problem-solving, which we shall call “fluent” (FPS–). The analysis of the temporal distribution of formulation was carried out by means of a mixed factorial design $3 \times 3 \times 2$, with proficiency level (level 1, level 2, level 3) as an intersubject factor, and period (period 1, period 2, period 3) and language (L1 and L2) as intrasubject factors. The dependent variable was the percentage of time each writer devoted to each of those formulation processes in relation to the total composing time.

Overall Formulation Processes

The ANOVA did not show significant differences for language $[F(1, 18) = 0.817; p > 0.5]$, an indication that the percentage of time devoted to overall formulation processes was similar across languages (L1: $\bar{x} = 72.2\%$, $SD = 5.81$; L2: $\bar{x} = 69.23\%$, $SD = 7.11$). This high percentage of time empirically confirms the contention about the substantial, nonoptional character of this process and provides evidence of the highly dominant role it plays within the composition process, at least in time-compressed tasks such as the ones analyzed here.

A significant effect was found for proficiency $[F(2, 18) = 3.914; p < 0.039; \eta^2 = 0.303]$. More precisely, pairwise analyses showed that the HS students ($\bar{x} = 82.48\%; SD = 5.25$) formulated for a longer period of time than both the SE ($diff. 17.164, p < .05$) and the Ph group ($diff. 17.960, p < .05$). This finding indicates that the lower one goes down the proficiency scale, the more dominant formulation is in the writing process, or conversely, that the probability of formulation sharing composition time with other processes increases as L2 proficiency improves. The fact that the SE ($\bar{x} = 65.32; SD = 5.09$) and the Ph ($\bar{x} = 64.32; SD = 5.43$) groups showed similar formulation means suggests that (a) once a certain
threshold level of proficiency has been reached, writers are more likely to share time between formulation and other processes, and (b) around 60% of total composing time devoted to formulation must be the minimum required for time-compressed tasks of this kind to be completed.

Within writing sessions, the allocation of time to formulation was found to be unevenly distributed throughout the composition process, the ANOVA test showing significant effects for period \( F(2, 36) = 14.301; p < 0.000; \eta^2 = 0.384 \). Generally, formulation concentrated in the central stages of the composition, as pairwise comparisons showed that the time spent on the process in the second period (\( \bar{x} = 78.16; SD = 4.57 \)) was significantly higher than that spent in the other two periods (\( diff. = 3.465; p < .05 \), between the second and the first period; \( diff. = 7.606; p < .05 \), between the second and the third period). Moreover, the lack of interaction between period and language \( F(2, 36) = 1.362; p > 0.5 \) suggests that this distribution of formulation time was impervious to the language that the writers were working in, a finding to be added to the repertoire of strategies and procedures that have been found to remain stable across languages (Arndt, 1987; Cumming, Rebuffot, & Ledwell, 1989; Jones & Tetroe, 1987; Pennington & So, 1993).

In spite of this general trend, the interaction between proficiency and period \( F(4, 36) = 4.701; p < 0.004; \eta^2 = 0.289 \) indicated that the patterns of distribution among the three groups showed some important differences (see Figure 1).

The most marked difference from the overall trend reported above occurred among the members of the HS group, whose percentage of formulation decreased systematically as the composition progressed. As shown in Figure 1, these participants spent around 90% of their time generating text during the initial stages of the composition; this later decreased to nearly 83% in the second period and dropped in the last period to 73%, a tendency that may be taken to reflect the gradual depletion of ideas when the chain of associations gradually faded away. Moreover, the overwhelming predominance of formulation time during the first period among
the members of this group was in contrast to the 68% and the 58% spent on it by the SE and the Ph students, respectively. The explanation probably lies in the greater length of time devoted to planning by these groups, especially by the Ph students. In short, there was a definite increase in the time spent on formulation during the first period as proficiency decreased, a trend which was reversed completely for the time spent on planning.

The patterns of time allocation to formulation were also different for the other two groups. The SE group showed a similar distribution, around 70%, during the first and second periods, with a sharp decrease to 52% during the last period, as a result of the large number of revision processes, which took up to 40% of composing time in this period. The Ph group, on the other hand, showed a more balanced distribution. In the first period, these writers consistently devoted the least time to formulation among the three groups, around 58% (diff. –28.50; p < .05, with the HS
group; diff. –9.44; p < .05, with the SE group), basically as a result of the time spent on planning at this stage. This trend was followed by a notable rise to around 81% in the second period, with a drop in the third period to 65%, which is midway between the percentages of the HS (\(\bar{x} = 73.18; SD = 11.22\)) and the SE group (\(\bar{x} = 52.58; SD = 10.90\)) during this period. These levels of overall formulation time among the members of the Ph group probably allowed for a better balance among composing processes, thereby promoting a more pronounced interaction among them.

*Fluent Versus Problem-Solving Formulation Processes*

Problem-solving was found to be another highly discriminating factor \([F(1, 18) = 44.374; p < 0.000; \eta^2 = 0.711]\). On the whole, “fluent” formulation processes (\(\bar{x} = 52.08; SD = 14.19\)) were significantly more numerous than those in which problems were tackled (diff. 34.835, \(p < .05\)). In addition, the lack of interaction between proficiency and problem-solving \([F(2, 18) = 1.548; p > .05]\) indicated that the ratio FPS–/FPS+ held steady across the three proficiency groups. In contrast, a high degree of variability was detected for the language of composing. There was a significant interaction between language and problem-solving \([F(1, 18) = 18.116; p < 0.000]\), indicating that the FPS–/FPS+ ratio took on different values depending on the language the writers were composing in, as shown in Figure 2.

In the L1 task, writers used five times more “fluent” formulation procedures than problem-solving ones (FPS–, \(\bar{x} = 59.71, SD = 16.62\); FPS+, \(\bar{x} = 12.61; SD = 10.03\)), while this ratio dropped to only twice as many on the L2 task (FPS–, \(\bar{x} = 45.90; SD = 17.58\); FPS+, \(\bar{x} = 23.32; SD = 14.47\)). This finding is clearly indicative of the more laborious nature of generating text in a second language because of the constraints imposed on writers’ composing capacities by the L2 (Moragne e Silva, 1989; Silva, 1993; Yau, 1991).
Discussion

The present study was undertaken in an effort to deepen our knowledge of composing processes in first- and second-language contexts. More specifically, our research has centered on the temporal description of the L1 and L2 formulation processes of a group of Spanish EFL writers at different levels of proficiency, with a view to contributing to the alleged specificity of L2 writing processes and capturing some of the developmental trends involved in the acquisition of formulation as a composing competence in its own right. In spite of being a labor-intensive task, this analysis has allowed us to detect certain behavioral patterns that would probably have remained hidden had we limited our analysis to the ordinary procedure of frequency counting.

The lack of significance of the language factor suggests that writers tend to allocate similar percentages of composing time to formulation regardless of the language in which they are writing.

Figure 2. Ratio of fluent formulation processes (FPS–) to formulation processes involving problem-solving (FPS+) by language.
This finding adds a further dimension to previously reported cross-linguistic similarities related to the abstraction levels at which writers plan (Jones and Tetroe, 1987), the attention to overall organization before and while writing (Sasaki and Hirose, 1996), the processing of discourse at a multiplicity of levels (Whalen and Ménard, 1995), the integration of mental representations at the verbatim, propositional, and situational levels (Cumming et al., 1989), the organization of goals (Skibniewski, 1988), the representation of the rhetorical problem (Moragne e Silva, 1989), the use of problem-solving strategies and complex text representations (Cumming, 1989), the application of organization skills (Valdés, Haro & Echevarriarza, 1992), and the overall approaches to the writing task (Arndt, 1987; Edelsky, 1982; Smith, 1994). In addition, this behavioral stability involved in the similar allocation of formulation time across languages could also provide converging evidence for those studies that have found a high degree of consistency of writers' composing behaviors across writing topics, genre, and writing sessions (Levy and Ransdell, 1995).

The predominance of formulation over other composing processes across languages empirically confirms the theoretical contention about the nonoptional nature of this process and makes it even more surprising to see how little attention it has received in the L2 writing literature (Roca de Larios et al., 1999; Smith, 1994; Zimmermann, 2000). Also, this prevalence of formulation bears out some findings of previous studies that, using time counts in L1 writing (Kellogg, 1987; Levy & Ransdell, 1995) or episode occurrences in L2 composition (Raimes, 1985; Whalen, 1993), found that the percentage of time and the percentage of verbalizations used for formulation processes ranged from 50% to 60%, respectively. The converging evidence gathered from these results (a) adds to our knowledge of the internal structure of the time-compressed composition task, commonly used in EFL teaching and assessment, by stipulating a minimum of around 60% of total composing time devoted to formulation as a necessary condition for task completion, and (b) broadens the scope of research on L2 writing tasks, which, to date, has focused its concerns on issues of
design, rhetorical structure, and cognitive demands (Kroll & Reid, 1994) or, alternatively, on the effect of time restrictions on writing performance from the perspective of L2 text quality (Caudery, 1990; Kroll, 1990) or revision (Porte, 1995).

Our data also indicate that, because the time allocated to formulation decreases as one moves from the HS to the Ph students, the possibility of the different composing processes sharing time tends to increase as writers become more proficient in their L2. As the time assigned to the different processes gradually evens out, the possibility of their activation will increase, as will the likelihood of each individual process interacting with the other processes. Thus it can be posited that a clear developmental pattern in our data points toward a greater interaction among processes as proficiency develops. This result is in line with previous findings in both L1 and L2 writing research that have associated successful writing with an appropriate balance among writing processes (Hayes & Nash, 1996; Pennington & So, 1993; Piolat, 1999; Raimes, 1987; Silva, 1989; Smith, 1994), flexible time allocation (Levy & Ransdell, 1995, 1996), or interaction with the emergent text in the form of more planning, editing, and revision (Raimes, 1987).

This trend toward the interaction among processes contrasted, however, with the behavior of the HS students. Their overreliance on formulation ran parallel to their minimal use of planning and revision procedures. In order to meet the demands of both the L1 and the L2 task assignments, these writers generally redefined the topic and the task by turning what was supposed to be an argumentative composition into a personal narration or a list of reasons for or against the claim. By doing so, they reduced the number of task constraints they had to meet and tackled the topics from a more familiar angle, which enabled them to select appropriate search sets from their knowledge bases and, as a result, generate memory probes with less difficulty than if more constraints had been incorporated. When their chain of associations began to tail off in the third period of the composition, the protocols reveal that these writers gradually replaced the time
spent formulating with a large percentage of off-task metacomments (about 18% to 24% of total composing time) clearly intended as a ploy to use up time or to allay anxiety. This behavior contrasted sharply with the noticeable emergence of reviewing episodes (about 25% to 40% of total composing time) among the subjects of the SE and Ph groups in the same period. It shows that in their composing repertoires, the HS writers did not have the reprocessing mechanisms that would allow them to break away from the limiting nature of the retrieval procedures mentioned above. The outcome was that, at this third stage, emotion strongly interacted with cognition to limit concentration (Miller Cleary, 1991), a situation that ultimately resulted in their lack of motivation to carry on writing.8

Recent temporal studies of L1 composition have shown that formulation is not entirely automatic, but rather a process involving an expenditure of cognitive resources that may vary as a function of task demands (Kellogg, 1987; Levy & Ransdell, 1995). Kellogg (1996) has pioneered the design of a framework intended to predict the type of demands imposed by L1 formulation processes on the different components of working memory. However, there is no evidence to our knowledge that a similar task has been attempted in L2 writing research. The distinction made here between FPS– and FPS+ can be regarded as a rough approach to the processes involved in such management of resources. In spite of the moderate statistical power, owing to the small sample size,9 our data indicate that formulation processes seem to have a temporal structure in which the time invested in explicitly tackling lexical and morphosyntactic problems and activating search procedures to solve them is roughly half (in the L2 condition) or approximately five times less (in the L1 condition) than the time spent generating text fluently or, at least, without the explicit occurrence of problems. In addition, what is striking about this ratio is that it seems to be impervious to the subjects' proficiency level. It should thus be regarded as a constant or necessary condition for the formulation process to function under the demands of the current task type. It seems that, faced with the
dilemma of either stopping text production to solve a problem or continuing to produce more text, writers deliberately or unconsciously opt to activate these processes in the proportion reported above. It is as if the task could not otherwise be accomplished within the time limits.10

One possible interpretation of this attentional pattern would be related to the regulatory function that the central executive, one of the components of working memory (Gathercole & Baddeley, 1993), exerts on the management of processes. As mentioned in the introduction, this regulatory function involves inhibiting some processes and activating others so as to ensure fluent, sensitive, and appropriate behavior for task completion. Seemingly, this intervention of the central executive in writing processes does not occur arbitrarily, but within the limits of an internal structure that manifests itself through this trade-off between both types of process. It could be that this ratio is facilitating the accomplishment of the task within a minimum level of quality individual writers set for themselves by considering simultaneously the intelligibility of their messages (principle of clarity) and the processing effort put into them (principle of economy) so as to meet the demands of the task environment, the audience, and time pressure as efficiently as possible (see Poulisse, 1997). If that is the case, it might be hypothesized that the coordination of the various formulation processes in terms of cost-effectiveness (Hayes, 1996) could be seen as one of the constitutive components of writing expertise. If this hypothesis were confirmed, it would add a new dimension to findings from studies that have postulated the existence of writing expertise and L2 proficiency as two different psychological constructs (Brooks, 1985; Cumming, 1989; Smith, 1994; Zamel, 1983).

The predominance of fluent or nonproblematic formulation processes over problematic ones11 reveals that the pervasive representation of writing as problem-solving falls short of accounting for all the processes involved in composing and, as a result, questions one of the basic tenets of the theoretical frameworks currently used in L2 composing research (Bereiter & Scardamalia,
Most research derived from these models has considered writing basically as a top-down process whereby predetermined content is instantiated as words on the page (see the introduction to this paper). As a result, a large body of information has been produced about the different kinds of thinking strategy, but very little is known about “how thinking is linked moment by moment with the production of text itself” (Galbraith & Torrance, 1999, p. 6). An alternative, more in line with the data presented above, would suggest that language processes are fore-grounded: Content would be seen as partly determined by top-down processes but also mediated by language-specific processing. From this perspective, both the structure and meaning of sentences develop while they are produced through bottom-up, largely automatic processing. Problem-solving would not be envisaged as the systematic, top-down specification of what lower-level processes must achieve, but as the writer’s response to the output of more autonomous, implicit lower-level processes. Galbraith’s (1999) conception of writing as a knowledge-constituting process could be considered as a first step in this direction in L1 research. This proposal could similarly be used for future studies in the second-language context.

Limitations and Suggestions for Future Research

In spite of the findings reported above, several issues still need to be examined in future research. The results of the interaction among processes were obtained by comparing the amount of time devoted to the different activities in the different periods and then inferring what the possibilities of sharing different types of processes might be for each group of writers. This means that the real transition from one activity to the next was not observed. A more refined way of analyzing this phenomenon might involve the use of writers’ signatures (Levy & Ransdell, 1996). This method involves the specific analysis of the moment-by-moment transition from one activity to the next and would probably
provide us with patterns reflecting each writer’s individual composing profile within and across languages and task types.

Another important limitation to our research design has been lack of control of the participants’ L1 writing ability. Although L1 writing ability has been reflected in each participant’s performance on the L1 task, its influence has nevertheless been assumed in an ad hoc fashion. If the standard of L1 writing ability is not controlled for, the data obtained may primarily reflect native-language writing ability, thereby overestimating second-language writing performance. Hence, future research will have to control for the independent contribution of L2 knowledge and writing ability before making warranted statements about any aspects of the formulation process. In a similar vein, factors such as age and writing instruction should also be controlled for, because they might help to explain differences in the time allocated to formulation.

Future research should also use text quality as an indicator of the effectiveness of the processes under study. The few studies that have divided composing into three or four stages have demonstrated different effects for particular composing processes depending on the stage at which they occur in the course of composing (Rijlaarsdam & van den Bergh, 1996; van der Hoeven, 1999). Questions worth investigating would include (a) to what extent differences among writers as to the duration of formulation co-vary with text quality; (b) to what extent differences among writers in the temporal organization of formulation co-vary with text quality; (c) to what extent differences in the duration of formulation within writers and between assignments co-vary with text quality; (d) to what extent differences in the temporal organization of formulation within writers and between assignments co-vary with text quality; and (e) to what extent differences in the interaction of formulation subprocesses co-vary with text quality.

Finally, a couple of methodological considerations should be mentioned. The procedure of dividing the total composition time into three episodes is problematic. The first one concerns the variance within episodes. The fact that a writer devotes, say, 30% of the time of the first episode to planning does not mean that s/he
is using a steady 30% throughout that period. The percentage is a mean, which implies that there is also some within-writer variance. This hints at the possibility that an aggregate variable, such as the proportions used in this study, is not the same as the activity itself. Proportions are the result of dividing the number of occurrences by the total number of verbalizations. The same proportion may be the result of a different number of occurrences in combination with a different number of verbalizations. Hence, the same figure can mean different things. A method must therefore be used in future studies that models both the within-writer and the among-writer variance. Another problem concerns the arbitrary number of periods used in this study, given that no explicit theory prescribes the optimal number to be distinguished. Unfortunately, as van den Bergh, Rijlaarsdam, and Breetvelt (1994) have shown in L1 writing research, there are differences depending on whether protocols are divided into three or five episodes. In addition, dividing the composition process into equal time episodes does not do justice to time on task. It seems to imply that all writers need the same amount of time to finish the task assignment. Ideally, therefore, arbitrary decisions with regard to the number of episodes should be avoided. An alternative to this state of affairs has been suggested with the use of multilevel models (see van den Bergh & Rijlaarsdam, 1996).

The second methodological issue concerns the decision to divide formulation into “fluent” and problem-solving behaviors. This distinction has served us well in the identification of further behaviors and in describing their interaction. The main advantage of the notion of nonproblematic formulation used in this context, which departs from the conceptualizations normally used in most studies, is that it does not eliminate the processes generally associated with transcription, namely rereading and pausing, as they are reflected in our protocols. On the other hand, our decision fits in well with the psychological mechanism usually posited by L1 retrieval models to account for idea generation, i.e., that the new ideas retrieved themselves become part of the probe. By rereading, the writer is scanning the already written ideas, that
is, the newly retrieved concepts, to transform them into part of the probe. Pausing episodes interspersed between rereading and transcription may be assumed to play a similar role.

However, the decision to segment the different problem-spaces the way we did also has its problems. A large number of examples from the protocols show that formulation problems are quite often ill-structured. With ill-structured problems, one’s own conception of the problem alters gradually as new elements are retrieved from long-term memory or from external sources. In writing terms, this amounts to saying that in formulation, the process of problem definition is not a given but is carried out while the writer organizes, reorganizes and elaborates on knowledge in the course of text production. This constitutes a serious challenge for the analyst, who initially has to postulate only general categories and then has to carefully examine the protocol so as to extract more specific categories that will further define the different problem-spaces. A case in point is the creation in this study of the ideational/textual category. It was originally intended to account for a number of formulation phenomena in the protocols that were not compensatory in nature. Because of this origin, the findings related to ideational/textual concerns should be treated with caution, because the category is bound to include a number of disparate behaviors. In future research, therefore, a qualitative analysis would be required as to how writers have used the various procedures included in this category. It would probably suggest that, in spite of similar amounts of time invested, there are substantial differences in the ideational/textual goals pursued by the different groups. If that were the case, the category would need to be divided into subcategories covering those different concerns.

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Notes

1Two additional components, the phonological loop and the visual sketch pad, are posited in the model as responsible for storing and maintaining verbal information and visual/spatial information, respectively, through rehearsal.
For the sake of argument, these components have been omitted in this discussion.

2This fact fits in well with experimental studies that have found indications of performance loss on picture and number naming, grammaticality judgments, and on the integration of semantic and syntactic information when the writers deal with these cognitive operations in their L2 (see Jeffery, 1997).

3This finding fits in well with the lack of tradition in the teaching of L1 writing skills in Spain. In spite of the enormous number of writing activities students have to do, the teaching of writing at all levels of the education system is generally neglected (see Camps, 1994).

4Translation of L1 task: School failure is more a result of teachers’ lack of responsibility in carrying out their teaching duties than of the attitude, effort, aptitude, and motivation of the pupils. Do you agree or disagree?

5This decision does not imply that (re)formulating cannot also exist in revision, as one of the reviewers rightly pointed out. The decision to exclude these reformulations from analysis is largely based on de Beaugrande’s (1984) look-ahead and look-back principle of linearization. While backward operations include actions the writer performs to identify and evaluate components of previously produced text, forward operations (those isolated here for analysis) encompass the production of subsequent parts of the discourse.

6This result contradicts Pennington and So’s (1993) finding that writers spent more time on writing in their L1 than in their L2, where pauses were found to be longer. However, the data collection procedures were different in each study. Pennington and So used observation as their main data-collection procedure, whereas our study used thinking aloud. It could be that the segments they counted as pauses actually concealed episodes of L2 syntactic or lexical searching, that is, genuine formulation processes that might have been revealed if a different methodology had been used.

7The total number of formulation occurrences is not directly reported by Raimes (1985) or Whalen (1993). We calculated it by adding the results reported for the activities of rereading and rehearsal, in the case of Raimes, and of transcription and rereading the already written text to produce more ideas and text, in the case of Whalen.

8Typical comments included such distractions as the subjects they had to study (“after doing this I’ll have to go home to study maths ... very appealing,” HS4), their writing environment (“it’s amazing how green that green building opposite here is ... somebody really crazy must have painted it like that ... verde que te quiero verde? [after a poem by García Lorca], HS3), their desire to give up (“I’m quite tired ... I’m going to give up ...”, HS7), or the writing blocks they were experiencing ( ... uuuuff ... aaahh ... I’ve just run out of ideas ... I don’t know what else I could talk about ... I’m just saying the same things over and over again ...”, HS1). Only one subject in the L1 task showed his enjoyment, self-evaluation, and self-approval (“olé ... olé ... the truth is that this topic is really interesting ... I love it ... it’s quite cool”, HS5).
This problem seems to be inherent to research using think-aloud as the main data-collection technique. In most L2 writing studies that analyze verbal protocols, the number of participants ranges from 3 to 12. Notable exceptions are Cumming (1989) and Uzawa (1996), who used 23 and 22 writers, respectively, in their analyses.

A cursory qualitative analysis of the data, however, reveals that the nature of the problems tackled by each group, as revealed by the balance between compensatory and ideational/textual purposes, was different. It seems that HS students and some SE writers spend more time trying to compensate for their linguistic deficiencies, whereas the Ph group and the remaining SE students seem to be more concerned with the accuracy of the ideas via the coherence/cohesion of the text, the handling of information from a topic-comment perspective, etc. Future studies will have to confirm this impression.

One might wonder whether this predominance of “fluent” versus problem-solving episodes would remain if rereadings and pauses were subtracted from the former. However, even pulling rereadings and pauses out of FPS, the time devoted to writing proper would be dominant in the formulation process. In fact, across languages and groups, writers invested almost twice the percentage of total composing time in writing proper ($\bar{x} = 33.21\%; SD = 13.74$) as they did in problem-solving ($\bar{x} = 17.83\%; SD = 9.16$).

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