Reading Expository Prose at the Post-Secondary Level: the influence of textual variables on L2 reading comprehension (a genre-based approach)

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Study Objective To investigate how text structure influences readers' comprehension across different levels of L2 competence, conceptual knowledge base and passage familiarity.

Subjects 36 medical Spanish-speaking graduates: 18 advanced and 18 high-intermediate L2 learners of 2 different levels of conceptual knowledge.

Design The published versions of 3 medical English abstracts (3 familiarity levels) underwent a rhetorical manipulation. The results of 3 reading tests were analyzed using one-way within-group ANOVAs. The data of a questionnaire eliciting background information on the Ss and those of the subjects' self-generated comments on each passage were both quantitatively (2 way between-group ANOVAs) and qualitatively analyzed.

Main Results Text familiarity exerted a strong influence in the reading outcomes of both groups. In the familiar abstract, a deficient structuring did not affect the reading scores of either group. In the moderately familiar abstract, the deficient structuring exerted a negative effect on the reading outcome of less skilled readers only. In the unfamiliar passage, the highly structured format did not improve the reading performance of either group (as compared to the score reached for the conventional structuring).

Conclusions Whereas textual familiarity plays a fundamental role on reading performance, structural variables seem to operate differently according to word and domain knowledge, and to textual familiarity, their role being more crucial in conceptually difficult materials and for lower ability readers.

INTRODUCTION

Swales (1990) argues that abstracts are a neglected field among discourse analysts, and adds that such a situation is unfortunate because abstracts are particularly suitable to genre investigation. Moreover, because of the over-production of professional literature which is seen as having an unmanageable size (Williamson et al. 1989), because too much time is needed to synthesize what is relevant, valid and worth further attention (Huth 1987), and because "reduction of large quantities of information into palatable pieces is essential for digestion" (Mulrow et al. 1988), abstracts are becoming an indispensable tool to keep up with what is being published in science and to follow the professional literature (Ulijn 1985).

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In the last 2 years, a number of articles on medical English (ME) abstracts have appeared in the biomedical literature (Altman and Garner 1987, Huth 1987, Lock 1988). They all show a growing concern, from the medical profession itself, for the way ME abstracts are structured (their lack of systematic structuring, their being uninformative and even misleading), as well as a plea for prompt corrective measures. The editors of several leading medical journals (e.g. *The British Medical Journal, Annals of Internal Medicine*) along with a multinational team interested in improving the communication of validated health care evidence (358 persons from 18 different countries) have since gathered and formed the *Ad Hoc Working Group for the Appraisal of Medical Literature* (1987). The group suggested that a possible solution to the problem would be for researchers to write their abstracts in such a way that key aspects of purpose, methods and results be consistently described in a standardized manner with prominent headings[1] and a controlled vocabulary. Such abstracts are referred to in the biomedical literature as "structured abstracts" (hereafter abbreviated as STR) in opposition to more conventionally structured abstracts (hereafter abbreviated as CON), these being well structured but without prominent headings (see Salager-Meyer, 1990 for the discourse structure requirements which a well structured abstract should fulfill).

In her discoursal studies on ME abstracts, Salager-Meyer (1990, 1991) produced evidence which supports the complaint formulated by the Ad Hoc Working Group. Indeed, she found that 48% of the medical abstracts she analyzed (from research papers, reviews and case reports) were structurally deficient (e.g. lack of one or several fundamental and necessary move(s), move recycling, illogical/unnatural order in move presentation), and she inferred that such structural flaws very likely prevent the smoothness of the reading process, do not allow the reader to efficiently assess the breadth and comprehensiveness of the whole article, and hinder overall comprehension. Salager-Meyer's assumption was not grounded on empirical research, but was based on the results of recent research on cognitive psychology and text and discourse analysis which have shown that the reading process is altered and the end-product (comprehension) hindered when a text is poorly structured. (Carrell 1984).

However, as Roller (1990) states, research on learning from prose has yielded many studies, a plethora of findings and a host of critiques. If important new information is to be gained from text research, Roller argues, researchers should manipulate the readers' world knowledge and text structure variables simultaneously.

THE EXPERIMENT

ABSTRACTS

Sample Texts amd Familiarity levels

In order to test Salager-Meyer's above mentioned assumption and to follow Roller's

advice, the following study was carried out: We considered three recently published ME abstracts drawn from two general readership journals: *Annals of Internal Medicine* and the *Journal of the American Medical Association (JAMA)*. Abstract ≠ 1 (from a review article) deals with the use of digitalis in the treatment of cardiac failure; abstract ≠ 2 (from a research paper) considers the effects of exercise on serum lipid and lipoprotein levels seen with changes in body weight; and abstract ≠ 3 (from a research paper) is concerned with the use of methotrexate in rheumatoid arthritis. The passages were selected jointly by the author of the present paper and two specialist informants (active researchers and fluent readers of English) on the basis of: (1) their being authentic and situationally appropriate language samples; (2) their similar length (192, 196 and 198 words respectively); (3) their similar level of linguistic complexity; and (4) their different degrees of subject-matter specificity. Abstract ≠ 1 was considered by our informants as the most specific passage (and thus likely to be the least familiar), abstract ≠ 2 as the most familiar one (it deals with a fashionable topic which is familiar even to the lay public), and abstract ≠ 3 as moderately familiar. As a matter of short hand convenience, we will refer throughout this article to "unfamiliar abstract ≠ 1" (although it cannot be said to be totally unfamiliar since, as we shall see later, the subjects who read the abstracts were medical graduates),[2] "familiar abstract ≠ 2" and "moderately familiar abstract ≠ 3". It is worthwhile mentioning here that these degrees of familiarity were confirmed later by the subjects who took part in this experiment (see *Subjects* Section below) in the self-generated comments they made about the different abstracts.

Original Versions and Rhetorical Manipulations (see Table 1)

Abstract ≠ 1 was originally published according to the guidelines suggested by the *Ad Hoc Working Group for the Appraisal of Medical Literature*[1]. Abstract ≠ 2 was originally published in a conventional format (CON), and abstract ≠ 3 was originally deficient (DEF) in its internal structuring (illogical order of move presentation)[3]. In order to measure the influence of structural variables on our subjects' reading comprehension, we rhetorically manipulated each abstract as follows: Abstract ≠ 1 was re-written in a conventional format (CON); abstract ≠ 2 was re-written in a structurally-deficient fashion (DEF), and abstract ≠ 3 was rewritten according to the guidelines suggested for a "structured abstract"(STR). Thus there were now three pairs of texts, each pair made up of one *original* and one *manipulated* abstract, as shown in Table 1.

Table 1

	Original	**Manipulated**
Unfamiliar	≠ 1 (STR) (192 wds)	≠ 1 (CON) (193 wds)
Familiar	≠ 2 (CON) (196 wds)	≠ 2 (DEF) (198 wds)
Moderately familiar	≠ 3 (DEF) (198 wds)	≠ 3 (STR) (199 wds)

STR = Structured abstract; CON = conventional abstract; DEF = structurally deficient abstract

In the rhetorical manipulations, special care was taken not to change the number of words and the meaning of any sentence (as compared to the published version of each abstract): no lexical items or other elements of the original sentences were changed. Therefore, the same content load as that of the original published version was maintained in the rhetorical manipulation performed on each abstract (see Appendix for the manipulation performed on abstract ≠ 2).

SUBJECTS

Thirty six Spanish-speaking medical graduates took part in the study. They were all general practitioners enrolled in their first year of specialist residency (clinical and surgical specialities) who had just completed a one-year English for Medical Purposes (EMP) course at the University Hospital of The Andes (Mérida, Venezuela). These thirty six Ss were in turn divided into two groups of eighteen Ss each, on the basis of the final grade they obtained in the EMP course (scale: 0 to 20). These groups were a High Intermediate (HI) group (EMP final grade between 13 and 15, inclusive and an Advanced (AD) group (EMP final grade between 16 and 20, inclusive), A t-test detected a significant difference between the mean EMP final grade of each group, $t = 3.039$, p = .0074. We can therefore assert that our two groups significantly differed from each other as regards their L2 competence. Because of the now well-recognized paramount role of language proficiency for successful ESL reading (see Devine *et al.* 1987), we purposely excluded from our study readers of low-level L2 proficiency because their limited control over the L2 would have short-circuited the readers' system when reading the abstracts (Clarke 1980, Cziko 1980).[4] Thus, as regards our subjects' L2 competence, it can safely be said that they had all reached the "linguistic threshold/ceiling level" mentioned by Clarke (1978).

The following background information on our thirty six Ss was collected via a questionnaire, drawn from University records and/or provided by the different medical departments: (1) the subjects' grade point average (GPA) in their undergraduate medical studies (this gave us an indication of their level of conceptual/medical knowledge); (2) the number of weekly hours they dedicate to reading English journals/books; (3) the frequency of obligatory "bibliographical" department meetings where the residents themselves present the results and conclusions of up-dated bibliographical searches on medical topics previously assigned by staff members. This last information gave us an idea of the students' level of motivation to read scientific materials in English.

READING TESTS

Each abstract (the original version as well as the rhetorical manipulation) was accompanied on a separate sheet by a reading test: five multiple-choice questions, each one made up of four carefully-worded distractors. The questions, written in

Spanish, tapped a particular detail in the text (micro-questions), addressed the overall theme of the passage or were related to a particular move (macro-questions). Extensive pilot testing was carried out to select questions of average difficulty, and items were selected to ensure approximately equal difficulty from one abstract to another. Finally – and so as to make sure there was no L2 linguistic limit on the readers' ability – each abstract was also accompanied by a list of the fundamental lexical items contained in it (although all the words had been previously seen and practised in context in the EMP course).

In order to investigate the role of structure across different levels of L2 competence, conceptual/domain knowledge, and text familiarity, each group (AD and HI) of eighteen Ss was in turn randomly divided into two groups of nine Ss each. Test Booklet A – which contained abstract ≠ 1 in its highly structured version (STR), abstract ≠ 2 in its conventional version (CON), and abstract ≠ 3 in its structurally-deficient version (DEF) – was given along with the question-sheets on each abstract to nine students from the HI group and nine from the AD group. Test Booklet B – which contained abstract ≠ 1 in its conventional version (CON), abstract ≠ 2 in its structurally-deficient version (DEF), and abstract ≠ 3 in its highly structured version (STR) – was given along with the question-sheets on each abstract to the remaining nine subjects from the HI group and the remaining nine subjects from the AD group (see Table 2).

Table 2

AD (i) (N=9)   Booklet A [≠ 1 – STR, ≠ 2 – CON, ≠ 3 – DEF]
HI (i) (N=9)

AD (ii) (N=9)   Booklet B [≠ 1 – CON, ≠ 2 – DEF, ≠ 3 – STR]
HI (ii) (N=9)

Lastly, upon completion of the task and as an optional activity, the students were asked to write any comments they wished to make regarding the abstracts they had just read. Such a procedure was undertaken in the belief that even more could be learned about the interaction of the variables under study.

SCORING AND STATISTICAL ANALYSES

The independent variables (factors) were: text familiarity (3 levels) and abstract structure (3 types). The dependent variable was the students' reading performance on the three comprehension tests. All the statistical tests of significance employed were run on a Macintosh Classic 40/4 Mo. with the StatView™ Program. The summary of descriptive statistics for comprehension scores (with their respective means, standard deviations and probability levels) are displayed in Figures 1 and 2 and in Table 3. The alpha level was set at .05.

The scoring of the dependent variable was a rather straightforward procedure. The number of correct answers obtained for each abstract (maximum score: 5) was recorded per subject, and cell means and standard deviations were computed for each group. One-way between-group factorial design analyses of variance (ANOVA) procedures (with L2 competence as independent variable) were used to compare the data obtained from the questionnaires. One-way within-subject ANOVAs (with text familiarity as independent variable) were applied to the data recorded from the test results to compare the reading performance within each group from one abstract to another, and between one structure and another within the same abstract.

RESULTS AND DISCUSSION

We shall first of all examine the results obtained from the questionnaires as regards the GPA, the amount of time dedicated to English reading a week, and the frequency of bibliographical meetings in each group. Then, we shall present the within-group findings (HI and AD) with respect to reading performance for each abstract taken separately, and for each structure-discriminated abstract.

A. QUESTIONNAIRE ANALYSIS

The average GPA of the HI group ranged from 10 to 16 ($\overline{X}$ = 13.44, SD = 1.85), while that of the AD group ranged from 14 to 19 ($\overline{X}$ = 15.38, SD = 1.97). A one-factor ANOVA procedure detected a highly significant difference between the GPA of both groups, $F (1, 34) = 10.42$, $p = .0049$. This means that our two groups were significantly different not only, as was found before, with respect to their L2 competence (EMP grade), but also as regards their level of domain knowledge. (This is why we shall refer in this paper to our subjects' "linguistico-conceptual level" as a global concept, rather than to their linguistic knowledge on the one hand and their conceptual knowledge on the other). The higher GPA of our AD subjects indicates that these readers were equipped with a better knowledge store than the HI readers. Moreover, since "the ability to read successfully has long been a criterion for success, especially in college where there is a close relationship between reading skills and success in courses that require fluent reading" (Reed 1989; 539), we can assume that our AD readers possessed well-developed top-down skills in their L1, skills which they have in all likelihood been able to transfer to a second-language situation. All in all then, we can speculate that our AD readers were good L2 readers. By contrast, the lower GPA of our HI subjects reflects a certain lack of schema availability. We can then infer that the HI readers, when compared to the AD ones, suffered from a gap not only in their linguistic competence (lower EMP grade) but also in their conceptual knowledge base.

As regards the number of hours each group dedicated to English reading per week, this was also much higher in the AD group than in the HI group ($\overline{X}$ = 6.9 and 1.3 respectively). A one-factor ANOVA also detected here a statistically significant difference between both groups, F(1,34) = 9.82, p = .006. The greater exposure to English materials of the AD readers may partly account for their better L2 competence, their sounder domain knowledge (scholarly papers written in English present the up-dated results of latest research), and their better general language competence. By contrast, the lower exposure of the HI group to L2 written materials may in part explain the previously mentioned linguistico-conceptual gap of this group of readers.

As for frequency of bibliographical meetings, 38% of the Ss from the HI group, vs. 88% from the AD group mentioned having such meetings every week (average duration: 3 hours). The remainder mentioned not having any meetings at all. The higher frequency of such meetings in the AD group very likely exerted a strong influence on the residents' intensity of motivational level to be successful L2 readers. According to Corder (1983), motivation is one of the important internal processes which facilitates acquisition and influences the use of language learning strategies.

Thus, on these three important variables (conceptual knowledge base, amount of language reading reported, and frequency of bibliographical department meetings), our two groups significantly differed from each other. These differences should be kept in mind as possible sources of influence on the analysis relating reading comprehension and structural variables.

B. WITHIN-GROUP RESULTS

B.1. High-Intermediate Group (HI)

B.1.1. Overall Reading Scores for Each Abstract (Figure 1)

Figure 1 shows that the HI group obtained the highest score for the familiar context of abstract ≠ 2, and the lowest for the unfamiliar context of abstract ≠ 1. Two one-way ANOVA procedures detected highly significant differences between both scores, F(1, 17) = 30.31, p = .0001, and between the score obtained for familiar abstract ≠ 2 and that recorded for moderately familiar abstract ≠ 3, F(1, 17) = 7.07, p = .011. These results mean that textual familiarity exerts a main positive effect on the reading performance of the HI group.

The comments some of the HI readers made are very enlightening in this respect: with respect to unfamiliar abstract ≠ 1, four of them mentioned that they were not interested in the topic of this abstract because it was not related to their speciality (the role of motivation), five wrote that they did not know much about the topic of this passage, and three simply reported that they did not like cardiology. By contrast,

Figure 1: Mean Reading Scores Obtained by the High-Intermediate Group (HI) and the Advanced Group (AD) for Each Abstract
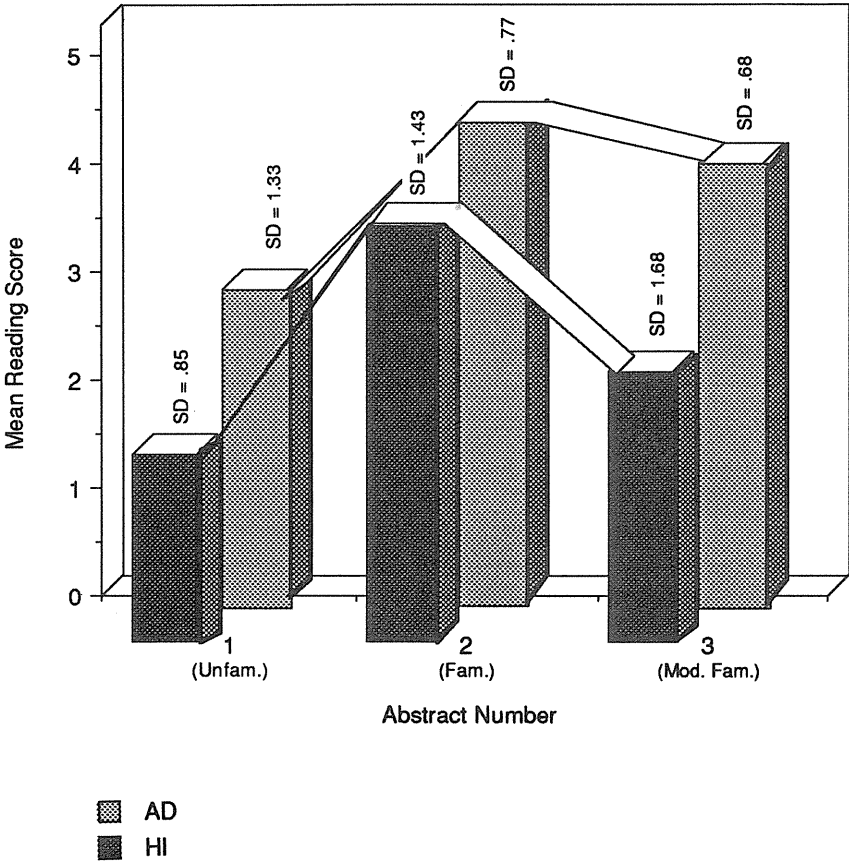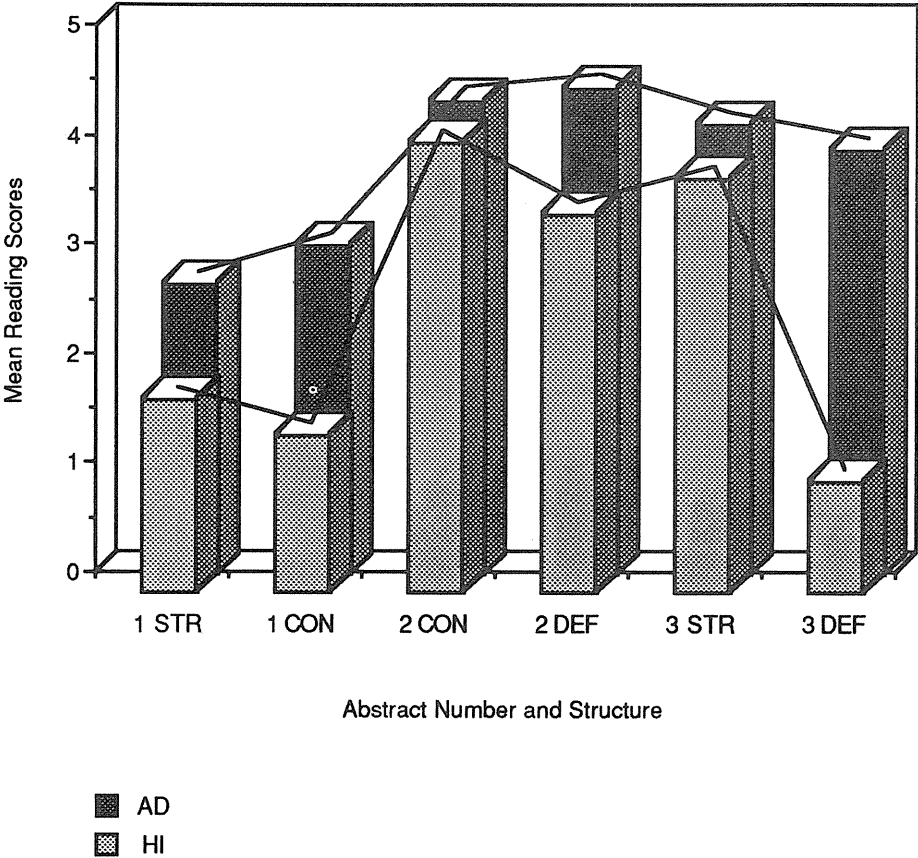

Notes: Maximum score on each abstract was 5.
SD = Standard Deviation
Differences significant at 95%:   HI (≠ 1 vs. ≠ 2 and ≠ 2 vs. ≠ 3);
                                                           AD (≠ 1 vs. ≠ 3 and ≠ 1 vs. ≠ 2).

Figure 2: Mean Reading Scores for Each Structure-Discriminated Abstract in Each Group of Subjects

STR: Structured
CON: Conventional
DEF: Deficient

Table 3: Mean Reading Scores for Each Structure-Discriminated Abstract in Each Group of Subjects

HIGH INTERMEDIATE GROUP				
ABSTRACT #	STRUCTURE	MEAN SCORES	Statistical Comparisons	p
1 (Unfam.)	STR	$\bar{x}$ = 1.77 SD = .66	F(1, 9)= .667	.437
	CON	$\bar{x}$= 1.44 SD = 1.01		
2 (Familiar)	CON	$\bar{x}$ = 4.11 SD = 1.2	F(1, 9)= 2.28	.169
	DEF	$\bar{x}$= 3.44 SD = 1.59		
3 (Mod. Fam.)	STR	$\bar{x}$ = 3.77 SD = .83	F(1, 9)=87.22	.0001*
	DEF	$\bar{x}$ = 1 SD = .78		

ADVANCED GROUP				
ABSTRACT #	STRUCTURE	MEAN SCORES	Statistical Comparisons	p
1 (Unfam.)	STR	$\bar{x}$ = 2.66 SD = .86	F(1, 9)= .286	.607
	CON	$\bar{x}$= 3 SD = 1.73		
2 (Familiar)	CON	$\bar{x}$ = 4.33 SD = .7	F(1, 9)= .082	.782
	DEF	$\bar{x}$= 4.44 SD = .88		
3 (Mod. Fam.)	STR	$\bar{x}$ = 4.11 SD = .78	F(1, 9)= .471	.512
	DEF	$\bar{x}$ = 3.88 SD = .6		

* Difference significant at 95%   **NOTE:** Maximum mean reading score was 5 for each abstract.

F: Results of one-way within-group repeated measure ANOVA

eight of them mentioned that they knew a lot about the content of abstract ≠ 2, and four reported having read different articles related to this topic in the past 2 years. Surprisingly, no comments at all were made on abstract ≠ 3.

B.1.2. Overall Mean Reading Scores for Each Abstract Discriminated per Structure (Table 2 and Figure 2)

When examining the scores obtained by the HI readers on each structure-discriminated abstract (see upper part of Table 3 and Figure 2), it can be seen that the highest reading score was recorded for the CON structure of familiar abstract ≠ 2, and the lowest for the DEF version of moderately familiar abstract ≠ 3. A one-way ANOVA procedure detected a significant difference between both scores, $F(1, 8) = 21.18$, $p = .0017$. It is interesting to note that the score recorded for the DEF version of familiar abstract ≠ 2 was the third best (out of six) on the HI reading scores. These findings suggest that a deficient structuring exerts a negative main effect on the reading outcomes of lower-ability readers in a moderately familiar context (≠ 3 DEF), but not on a familiar passage (≠ 2 DEF). Furthermore, that the HI readers obtained their worst score for the DEF version of the moderately familiar context of abstract ≠ 3 leads us to believe that the "double-handicap" of this passage (relative unfamiliarity and deficient structuring) sets a real problem for lower-ability readers.

The "double handicap" represented by abstract ≠ 3 is confirmed by the fact that, as the asterisk in Table 3 (upper part) indicates, the only significant difference in reading scores within one and the same abstract is found when comparing the reading score recorded for the STR version of moderately familiar abstract ≠ 3 to that obtained for the DEF condition of this same abstract, $F(1, 8) = 87.22$, $p = .0001$. No such difference is observed within the other two abstracts. It is then in a moderately familiar and poorly structured context only that the previously mentioned linguistico-conceptual deficiency (see section A above) of the HI group is most evidently brought to the fore. This finding allows us to speculate that below a certain level of conceptual difficulty (and above a certain threshold level of L2 competence) reading comprehension is not sensitive to structural variables.

To further assess the role of passage familiarity and that of text structure on the HI readers' reading performance, we conducted three one-way ANOVA procedures to contrast the reading scores obtained for the same structure of two abstracts of different familiarity levels. We compared:

a.   the score recorded for the CON version of abstract ≠ 1 to that recorded for the CON version of abstract ≠ 2: $F(1, 17 = 24,45$, $p = .0002$, in favour of the CON version of familiar abstract ≠ 2;

b. The score obtained for the DEF version of abstract ≠ 2 to that obtained for the DEF version of abstract ≠ 3: $F(1, 17) = 15.24$, $p = .0013$, in favour of the DEF version of familiar abstract ≠ 2;

c. the score recorded for the STR version of abstract ≠ 1 to that recorded for the DEF version of abstract ≠ 3: $F(1, 17) = 21.77$, $p = .0016$, in favour of the STR version of moderately familiar abstract ≠ 3.

As can be seen, in all three instances the statistical test detected a main positive effect for textual familiarity on reading outcomes, a finding which supports what we said before (B.1.1), vis., that for HI readers text familiarity plays a fundamental role in reading comprehension, probably more important than that of internal structuring.

To sum up, the results suggest that for HI readers who have already reached a certain threshold level of L2 competence:

1. Broadly speaking, *text familiarity* exerts a strong influence on reading outcomes.
2. In a *familiar context* (≠ 2), a deficient structuring does not exert a significantly negative influence on the reader's reading performance. This in turn suggests that textual familiarity is more important than structural variables when the passage read is familiar to the reader.
3. In a *moderately familiar context* (≠ 3), a deficient structuring does exert a main negative effect on the reader's reading performance when this performance is compared to that recorded for the STR condition. Thus, the so-called "structured abstract" format we referred to in the Introduction of this paper (1) seems to dramatically improve the reading performance of lower-ability readers with relatively unfamiliar materials: such a structure indeed seems to help readers to override processing difficulties brought about by a relatively unfamiliar content.
4. In an *unfamiliar context* (≠ 1), the prominent headings characteristic of a "structured abstract" (STR) do not significantly improve the reader's reading performance when this performance is compared to that reached for the conventionally structured format (CON). However, as a consequence of the results expressed in 3 above, it is to be expected that lower-ability readers would perform significantly better with a highly structured (STR) abstract on an unfamiliar topic than with a structurally-deficient (DEF) one.

B.2. Advanced Group (AD)

B.2.1. Overall Mean Reading Scores for Each Abstract (Figure 1)

The first finding which strikes the eye when looking at Figure 1 is the fact that the score-representing curve of the AD group is flatter than that of the HI group. This suggests that there is much more variability in the reading scores of the HI group

than in those of the AD group; such a variability in turn tends to confirm the previously mentioned linguistico-conceptual deficiency of the HI group (as compared to the AD group). This finding does not agree with Demel's results (1990) regarding the relationship between overall reading comprehension and comprehension of coreferential ties for second language readers of English. According to Demel, "the skills necessary for successful comprehension of natural texts may not be sensitive to proficiency level, at least not above a threshold level of proficiency reached by the subjects" (1990: 275). Our study indicates that, even above a threshold level of L2 proficiency reached by the readers, the skills necessary for successful comprehension seem to be sensitive to L2 proficiency levels. All seems to depend on how familiar the readers are with textual content.

Figure 1 shows that the AD readers scored better (as did the HI group) with the familiar topic of abstract ≠ 2, and worse with the unfamiliar topic of abstract ≠ 1. Two one-way ANOVA procedures detected highly significant differences between both scores, $F(1, 8) = 18.15$, $p = .0002$, and between the reading score recorded for unfamiliar abstract ≠ 1, and that recorded for moderately familiar abstract ≠ 3, $F(1,8) = 9.36$, $p = .007$. These results indicate that textual familiarity exerts a significant main effect on the reading performance of mature readers too.

Some readers from the AD group made comments indirectly related to the level of familiarity of the abstracts. With respect to abstract ≠ 3, five of them stated that the topic of this abstract in some ways related to their speciality, and two that they had just completed a term paper on rheumatoid arthritis. As for abstract ≠ 2, ten subjects mentioned – with some variation in wording – that the content of the passage was easy for them because the topic was of current interest to them.

That both groups of readers scored significantly better for the familiar passage (≠ 2) (and worst for the less familiar contexts of abstracts ≠ 1 and ≠ 3) adds further support to the results of reading research which have led most L1 and L2 cognitive psychologists to agree that the comprehension process is partially dependent upon the relationship between the information contained in the text and the readers' prior knowledge. It can also be incidentally noted (see Figure 1) that the scores of the AD group were as a whole much higher than those of the HI group: this corroborates the latest result of schema-oriented research which underscores the importance of general linguistic competence (text-based processes) and background knowledge (knowledge-based processes) on reading comprehension (Devine et al. 1987).

B.2.2 Overall Mean Reading Scores for Each Abstract Discriminated per Structure

When the reading scores recorded for the AD group are analyzed in each structure-discriminated abstract (Table 3, lower part, and Figure 2), we can see that the two best scores were obtained for both versions (CON and DEF) of familiar abstract ≠ 2. But, contrary to what was found for the HI group, no significant differences in the

reading performance of the AD readers emerged within any abstract (i.e. when comparing the scores recorded for both structures within one and the same abstract). This finding suggests that in familiar as well as in less familiar passages, structural variables do not significantly influence the reading outcomes of skilled readers, whereas, as we said before, textual familiarity does.

The influence of passage familiarity and that of text structure on the AD readers' reading performance was further assessed by comparing the scores obtained for the same condition of two abstracts of different levels of familiarity. Two one-way ANOVAs revealed a main significant effect for passage familiarity when comparing:

1. the score recorded for the CON version of abstract $\neq$ 2 to that recorded for the CON version of abstract $\neq$ 1: $F(1, 8) = 5.81$, $p = .042$, in favour of familiar abstract $\neq$ 2;
2. the score obtained for the STR version of abstract $\neq$ 1 and that obtained for the STR version of abstract $\neq$ 3: $F(1, 8 = 10.56$, $p = .011$, in favour of moderately familiar abstract $\neq$ 3.

These findings support the previous one: even for skilled readers, passage familiarity exerts a powerful effect on reading outcomes.

That the reading performance of our AD subjects was not significantly affected by the deficient structuring of the familiar ($\neq$ 2) or the moderately familiar ($\neq$ 3) passages suggests that the broader linguistic-conceptual background of our AD readers allowed them to compensate for poor structuring, whether the passage they were processing was familiar or moderately unfamiliar. This provides support for the hypothesized interaction in L1 reading between structure variables and knowledge already mentioned by Berkowitz (1986) and Horowitz 1987). Then, just as it has been repeatedly said that relevant background knowledge possessed by the reader may be able to compensate for some of the reader's linguistic deficiencies (Coady 1979), our study indicates that the reader's relevant conceptual background knowledge and adequate L2 competence may compensate for poorly structured materials. This is consonant with the findings of previous research (Stanovitch 1980) that good readers have a larger repertoire of compensating strategies to draw upon than poorer readers.

It is interesting to note that the only students who made some comments on the way the abstracts were structured belonged to the AD group. Although this group scored roughly the same on both versions of abstract $\neq$ 3, their comments clearly show that they experienced more difficulty in reading its DEF version than in reading its STR version. Indeed, out of the nine AD subjects who read the STR condition of

abstract ≠ 3, two wrote that they knew about the content of the text, and that the text was "easy to read", and two others mentioned that the passage was easy to understand because it was "well written". On the contrary, of the nine residents who read the DEF version of this same abstract, three mentioned that, although they were familiar with the topic, they had difficulty understanding the text because of its "weird organization". The same holds true for abstract ≠ 2: the only readers who mentioned that the DEF structure of abstract ≠ 2 was "more difficult" than the abstract they had previously read in their Test Booklet (i.e. the CON version of abstract ≠ 1) belonged to the AD group. Such comments are interesting indeed because they directly or indirectly point to the readers' structure-awareness. This structure-awareness is very likely a consequence of the much greater exposure to written materials (in both L1 and L2) of the AD readers (see Questionnaire Analysis above); their knowledge of previous texts may have led them to sufficient recognition of informational arrangements and rhetorical structure so as to enable them to invoke the formal schemata characteristic of the abstract genre. Thus, the solid body of empirical research which has shown that knowledge of a text structure aids comprehension (Carrell 1984) and that knowledge of a rhetorical scheme (or organizational pattern) of a piece of discourse is critical for its effective recall and understanding (Taylor 1980; Kintsch and Yarbrough 1982) is indirectly confirmed by our research.

CONCLUSION

In this study we have gone beyond collecting mere test results to develop a model of analysis that incorporates both written protocols and task products. The results of this work are clearly suggestive in their general implications for L2 reading processes, particularly as to the paramount and fundamental role of knowledge structures in reading comprehension. Structural variables appear to function differently at different levels of linguistic and world knowledge: At lower-levels of language proficiency, structure information may be more useful (i.e. facilitating learning) in moderately familiar and unfamiliar domains that in familiar ones. On the other hand, the reading performance of mature readers does not seem to be affected by structural variables whatever the level of passage familiarity.

Another conclusion to be drawn from our study is that when presenting conceptually difficult materials to a group of high-intermediate L2 learners, language instructors should first check how satisfactorily this material is structured so as to avoid overloading the readers with a double burden which will hinder their reading performance. A highly structured format – with prominent headings which would help readers to perceive the notional blocs that comprise a text – could dramatically enhance the reading outcomes of less skilled readers who have to cope with conceptually difficult materials.

A final (tentative) conclusion is that there may be some pedagogical value in sensitizing students to rhetorical effects and to rhetorical structures that recur in genre-specific texts, to activate and develop formal schemata, to have learners schematize and/or criticize different textual structures and provide prototypical examples of scientific rhetoric. It is very likely that consciousness-raising about text-structure will turn out to be in the near future an important ingredient in ESP courses, not only for reading but also for writing purposes.

[1] For research papers, the 7 prominent headings are: 1. Objective, 2. Design, 3. Setting, 4. Patients, 5. Interventions, 6. Measurements and main results and 7. Conclusions. For review articles, the recommended 6-heading format is: 1. Purpose, 2. Data identification, 3. Study selection, 4. Data extraction, 5. Results of data synthesis, and 6. Conclusions.

[2] We did not (and very likely could not) consider texts which are totally unfamiliar because our subjects were all medical graduates and our sample texts were drawn from medical periodicals; thus, the situation of "total unfamiliarity" was very unlikely to occur.

[3] It must be stated here that the deficient structuring (illogical order in move presentation, e.g., the "purpose" of the paper appears as the last move, or the "conclusion" is stated before the results) was noted in our previous study (Salager-Meyer 1990) as one of the most frequent structural flaws in medical English abstracts. It cannot therefore be said that the DEF rhetorical manipulation produces an artificially scrambled text, i.e., a text that would never occur. On the contrary, the DEF rhetorical manipulation performed in our experiment produces a text which is actually very close to an actual text.

[4] The results of this research thus relate only to the importance of structural variables for high intermediate and advanced nonnative readers of English and not to the role of such variables for weaker students.

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