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Mémoire des textes et vieillissement : Effet de la perspective de lecture sur le rappel de l'information sémantiquement reliée

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Abstract

Introduction: Impaired episodic remembering is one of the most salient features of cognitive aging.

Objective: The present study examined age-related differences in text memory, focusing on the extent and nature of these differences.

Method: Young (18-25 years) and older (73-77 years) adults were required to recall a descriptive text they had read after being given either a reading perspective (title or verbal instruction) or no indication. In the two experimental conditions, some idea units were important from a functional point of view, as they had to be selected to recall semantically related information better. Text information also had to be differentiated from general information.

Results: Participants did not exhibit any real age-related difficulty taking account of a title or a verbal instruction before reading. Nevertheless, our results showed that the older adults had poorer text memory, and produced fewer idea units from the text they had read and more extratextual idea units. These units mainly took the form of inferences from the text, in the case of the young adults, but were based more on general knowledge of the world in the case of the older ones.

Conclusion: Overall, these results suggest that young and older individuals recall quantitatively and qualitatively different information. Taking individual performance profiles into consideration, results are discussed in the light of the inhibitory process impairment hypothesis. This cannot, however, explain all the observations we made. Another plausible explanation is that older adults are more prone to memory distortions, involving *gist-based* rather than *verbatim* retrieval, the

former possibly compensating for the age-related decline in episodic memory. According to this hypothesis, our results may also highlight an age-related change in communicative goals.

Keywords[max: 5]*:* episodic memory, reading perspective, text recall, aging, inhibition, false memories

Résumé

Contexte et objectif : Les difficultés de mémoire épisodique sont une caractéristique importante du vieillissement cognitif. Cette recherche examine les différences liées à l'âge dans la mémoire de texte et explore leur ampleur et leur nature.

Méthode **:** De jeunes adultes (18-25-ans) et des adultes âgés (73-77 ans) doivent rappeler un texte descriptif, avec une indication de lecture donnée au préalable (*i.e.* un titre de perspective ou une consigne verbale de prise de rôle ; Pichert & Anderson, 1977), ou sans aucune indication (groupe contrôle). Avec de telles indications, des informations du texte deviennent importantes d'un point de vue fonctionnel et sont alors préférentiellement rappelées.

Résultats **:** Nous n'avons pas observé de réelles difficultés avec l'âge à tenir compte 1/ du titre de perspective, ou 2/ de la consigne verbale donnée avant la lecture, afin de rappeler l'information sémantiquement reliée. Cependant, nos résultats montrent que les sujets âgés rappellent : (a) moins d'unités d'idées identiques ou semblables à celles du texte lu ; (b) davantage d'unités extra-textuelles. Ces dernières sont principalement des inférences élaborées à partir de l'information réellement lue chez les jeunes adultes ; elles sont en revanche davantage basées sur l'univers référentiel et la connaissance du monde chez les

âgés. Globalement, ces résultats suggèrent que les adultes âgés rappellent de l'information quantitativement et qualitativement différente.

***Conclusion* :** En tenant compte de la variabilité des profils de rappels, l'hypothèse d'une faiblesse de l'inhibition chez les âgés n'apparaît pas suffisante pour rendre compte de l'ensemble des observations. Une autre hypothèse convoque les recherches sur les erreurs de mémoire, liées à une possible compensation des difficultés mnésiques survenant avec l'âge (traces *gist* plutôt que *verbatim*). De façon complémentaire, les résultats pourraient également témoigner d'un changement des buts communicatifs chez les âgés.

Mots clés : mémoire épisodique, perspective de lecture, rappel de texte, vieillissement, inhibition, faux rappels

Introduction

In the field of memory, many studies have reported very heterogeneous performances among older individuals. These performances are mainly preserved in semantic memory and/or implicit tasks, but are impaired in explicit episodic tasks, such as text recall (Charlot & Feyereisen, 2005). Two main explanations for these differences are generally put forward: the verbal nature of some tasks, and the fact that episodic memory tasks require higher levels of information processing and executive control, the latter being particularly sensitive to the effects of aging. Written text processing involves just such high-level processes (thematic, morphosyntactic, semantic and pragmatic processing), and individuals have to be able to control the course of their reading, to improve their comprehension and learning (e.g., Vellutino et al., 2007). Similarly, information retrieval in free recall situations requires significant cognitive control. In these situations, individuals must engage in the "self-initiated updating" of information in memory (Isingrini & Taconnat, 2008, p. 594). As a result, significant differences in performance between young and older adults are usually expected in memory tasks that are demanding in terms of executive control, such as verbal memory and/or free recall tasks.

Hasher and Zacks (1988) associated memory decline in old age with inhibitory process impairment. According to these authors, the mechanisms for activating relevant information in memory (which are largely preserved with age) and the mechanisms for inhibiting irrelevant information in memory contribute to the success of the ongoing goals, by allowing all these elements in memory to be controlled (Zacks,

Hasher, & Li, 2000). Older individuals may have much more difficulty than younger adults (a) keeping irrelevant information out of working memory (WM), (b) deleting information in WM that is no longer relevant for the ongoing processing and might otherwise overload or clutter this memory store, and (c) preventing the production of dominant - or more accessible - responses before considering alternative ones (Hasher et al., 1999).

The supposed decline in inhibitory control with aging (in terms of filtering, deletion and restriction/blocking; e.g., Friedman & Miyake, 2004) manifests itself in failures of memorization and comprehension, an increased risk of false memories (e.g., Hamm & Hasher, 1992; Hartman & Hasher, 1991; Hasher et al., 1997; see also Bouëdec et al., 2002; De Beni et al., 2003; Palladino et al., 2001).

Although the hypothesis that an inhibition deficit is mainly responsible for age-related cognitive impairments has since been discussed and nuanced (see Charlot & Feyereisen, 2005, for a comprehensive review), the existence of a close relation between episodic memory performance and the level of executive functioning (on which inhibition depends) is no longer in doubt. Indeed, more than a decade ago, Isingrini and Taconnat (2008) pointed out that many studies had shown that "the deficits observed in the elderly in the strategies of encoding and retrieval in episodic memory are explained in a significant way by the executive deficit that accompanies aging" (p. 591).

In parallel, studies in the field of memory distortions and false memories have revealed a significantly greater presence of (a) off-target verbosity (OTV) content in the texts produced by older adults and/or (b) extratextual information. In text memorization and recall tasks, even if

they are instructed to recall solely what has been said or read, older people tend to introduce new information that was not present in the source text (i.e., added information that is untargeted and possibly erroneous in terms of its content; e.g., Lövdén, 2003).

As early as 1983, van Dijk and Kintsch proposed a double reading (positive vs. negative) of extratextual information included in text recall. Their model assumed that extratextual information supports the recall performance, by helping participants either to make logical inferences during text comprehension or to draw links between the text and their own referential knowledge (pragmatic inferences). In the latter case, extratextual information contributes meaningfully to the elaboration of the text's meaning and is included in the situational model (i.e., representation of the situation described by the text; Kintsch, 1988). This *referential* level of processing also appears to be relatively well preserved with age, unlike the linguistic (text surface: words and syntax) and semantic (text base or *propositional content*) ones (see Radvansky, 1999; Radvansky & Dijkstra, 2007)[1]. Then again, this additional information may impair recall performance, by distorting the verbal material, or simply serve to conceal the individual's difficulty remembering the details.

In order to understand and explain intrusions, distortions and false memories better, for both young and older people, researchers have put forward two theoretical propositions, which have more similarities than differences (Corson & Verrier, 2013): fuzzy trace theory (e.g., Brainerd

[1] Some authors do not exclude the possibility that some aspects of constructing situational models may be age sensitive, such as the ability to access the first character in a story when a new one has been introduced. In addition, it takes older people longer to encode information about a new character when others already inhabit the discourse space (Noh & Stine-Morrow, 2009).

& Reyna, 2002; Reyna & Brainerd, 1995) and activation-monitoring theory (Johnson, Hashtroudi, & Lindsay, 1993). Fuzzy trace theory postulates the existence of two different types of memory traces in episodic memory, encoded in parallel and stored separately: (a) verbatim traces (i.e., perceptual or surface details of an experience, such as text words), which favour precise recall if they are retrieved from memory; and (b) gist information, which represents the commonalities between experiences (Arndt, 2010). The latter is more likely to cause memory errors, by activating knowledge that is compatible but not perceived or read, and therefore potentially erroneous.

According to Lövdén (2003), age-related differences can be explained by developmental changes in the balance between verbatim processes (based on surface details) and gist processes, which may result in more memory errors (i.e., more intrusions of semantically compatible information related to the spreading activation of the semantic network when acquiring information). Older people are therefore less accurate and demanding in their recall, in terms of source content. Isingini and Taconnat (2008, p. 594) added that "memory errors appear when the subject is unable to develop a controlled search in memory" that would make it possible to identify the source or origin of the information. Accordingly, in this theoretical framework, memory errors are conceptualised as *source monitoring* errors (Johnson et al., 1993), where older individuals increasingly confuse internally generated information (i.e., gist information, linked to the *referential* processing that engages the reader's mental world) with the information that they actually perceived (i.e., verbatim trace; lexical and syntactic processing).

Older people are known to have difficulty performing tasks that require cognitive control, such as text recall. In this task, the implementation of self-initiated strategies is crucial for (a) retrieving the information that was actually read and its learning context, and (b) improving the comprehension and memorization of the text as of the encoding (e.g., by organizing the presented information). At this level, titles and other reading indications provided before reading can play a strategic role, as they are thought to activate a representation in WM that helps to control the reading activity and favours the selection of important information: “text comprehension involves the correct identification of the theme first, the implementation of this theme in the selection of relevant information and in the organization of the text base second” (Coirier et al., 1996, p. 95).

Classically, textual information has both (a) structural importance, associated with the hierarchical position of the propositions (or idea units) in the text’s underlying structure, and (b) subjective importance, which readers allocate to each idea unit according to their interests and/or expectations. Information can also be functionally important, when a *signal* targeting a theme is given and/or imposed before reading. Titles and verbal instructions inviting readers to take a particular perspective (e.g., put themselves in the shoes of a character) are good examples of this signaling (e.g., Anderson & Pichert, 1978; Baillet & Keenan, 1986; Kozminsky, 1977; Pichert & Anderson, 1977).

These early studies showed that in younger adults, the importance of a text element and the likelihood that it will be learned are not determined solely by its position in the structure of the text base. In other words, the importance given to the information is not fixed and may

vary according to the perspective, that is, the nature of the context supplied before reading. A title or verbal instruction o can provide this context, favouring certain items of information over others, regardless of their hierarchical position.

Consequently, the presence of this type of context has functional (and not just structural) aspects, and defines which information is important (i.e., semantically related to the reading instruction) for the cognitive regulation of the reading activity. Because it is more accessible, this *targeted* information is recalled significantly better than it would be in the absence of such a context.

Can we relate this early research to current theoretical fields and shed light on older individuals' text recall performance? Given that readers activate their knowledge of the theme in order to analyse and interpret the information they are reading, what about the role (or *use*) of referential knowledge activated in memory by a perspective supplied beforehand? What are the age-related consequences for text recall? The objective of the present study was thus to compare the ability of young and older adults to use a reading indication to memorize and recall a text. By analysing the quantity and quality of the idea units they produced in a free recall situation, we would be able to study the recall of extratextual information (i.e., information already stored in memory and activated during reading), compared with the recall of information contained in the source text.

More specifically, we used a descriptive text that could be read from at least two perspectives (burglar vs. homebuyer; Pichert & Anderson, 1977), with the objective of examining according to age (a) whether a reading indication (title or verbal instruction) can favour the learning of

semantically related information, resulting in better recall of the latter, and (b) whether the types of idea units recalled differ and how.

Successfully performing the task would depend on the participants' ability to (a) remember the information they read, (b) control information that was potentially relevant but did not meet the selection criterion indicated by the reading perspective, thus allowing text information semantically linked to this perspective to be preferentially recalled (as observed in the original studies), and (c) control for the referential knowledge activated in their mental world. Consequently, given what is known about the recall difficulties of older people, we expected older participants to have difficulty controlling potentially relevant information that did not meet the selection criterion indicated by the reading perspective (Hypothesis 1). This would notably be reflected in the number of idea units they recalled that were related to the target perspective, which would differ little from the number of idea units related to the other perspective (sustained activation of information in WM). The recall of the young adults would be dominated more by idea units related to the target perspective. Even though all the participants were explicitly asked to recall the original text information, we expected older participants to add more information (i.e., information not contained in the source text), especially when a reading indication particularly elicited referential knowledge (possible WM overload) (Hypothesis 2). Moreover, this extratextual information might be qualitatively different in older participants (*untargeted*; i.e., not related to the content of the source text).

Method

Participants

We took several precautions to minimize the heterogeneity of the older adults' profiles, which is often more marked than that of younger adults (De Beni et al., 2003). First of all, regarding the place of recruitment: young adults were recruited either at a university (62.5%), in institutions for young workers, or via the experimenter's own network, but outside the university (37.5%). Older adults were recruited either in their homes (62.5%) or in sheltered housing schemes (37.5%). Next, there were as many men as women in both age groups and the participants' profiles were systematically evaluated with (a) a health questionnaire including an assessment of fine motor skills and sensory (vision/hearing) abilities, administered to all participants to screen out individuals with difficulties (none of them had psychiatric or neurological antecedents), (b) the Geriatric Depression Scale (GDS $\leq$ 5/15; Yesavage, 1988; French adaptation by Clément, 1997), Mini Mental State Examination (MMSE > 23/30; Folstein et al., 1975; GRECO[2], 2003), and a fluid intelligence test (B53; Bonnardel, 1967), administered to the older participants to ensure that they were not in a depressive state and did not have any cognitive impairment, and (c) a vocabulary test (Mill-Hill) administered to all participants. We selected the B53 as the second level of cognitive assessment for the older participants as the MMSE cutoff score we used at the time of data collection was rather low, in view of the GRECO's current standards. Any participant who did not understand the instruction and/or did not

[2] GRECO: Groupe de Réflexion sur les Evaluations COgnitives [Think Tank on Cognitive Assessments].

actively engage in the B53 and provide a minimum of 5 correct answers was removed from the study population, regardless of his or her MMSE score. Fluid intelligence was also evaluated because of research showing that interindividual differences in fluid intelligence are linked to interindividual differences in executive functioning (e.g., Holland & Rabbitt, 1990; Isingrini & Vazou, 1997). Finally, the older adults had to have left school no earlier than age 12 years (minimum cultural level of 5), and the young adults no earlier than age 16 years. All of them gave their written informed consent before participating in the study.

Based on these criteria, we selected 96 participants: 48 young adults with a mean age of 21.5 years (range: 18-25) and 48 healthy older adults, with a mean age of 75.2 years (age range: 73-77). Performances on the vocabulary test were comparable across the young (mean score: 25, *SD*: 3.17) and older (*M*: 25.5, *SD* 4.52) groups, but young participants scored higher on fluid intelligence, corresponding to a frequently observed performance profile. The ratio of correct answers to completed items indicated a mean success rate of around 85% for young adults and 56% for older ones ($p < .001$).

For the study, the 48 participants in each age group were equally divided into three subgroups of 16 participants, each corresponding to one of the three reading conditions (no indication, verbal instruction, title). Within each subgroup, we controlled for the different criteria applied to the whole sample and to each age group (e.g., the proportion of the individuals according to place of recruitment, sex, education level). Moreover, the distribution of scores (Mill-Hill, B53, MMSE, GDS) within these subgroups was tested for each age group (simple ANOVA).

The young adults' performances did not differ between subgroups (i.e., according to reading condition) for either vocabulary (Mill-Hill), $F(2, 45) = 1.22$, or fluid intelligence (B53), $F(2, 45) = 1.05$ for number of completed items and = .59 for number of correct answers. It was the same for the older participants, $F(2, 45) = .85$; =.63; and = 1.97.MMSE scores did not differ significantly across the three subgroups of older adults, $F(2, 45) = .09$ ($M = 25.96$, $SD = 1.26$). Scores below 26 were equally distributed (i.e., 4 or 5 participants according to reading condition; $n = 14$). Finally, the mean GDS score of the older adults was 3.71 (range: 0-5), with no significant differences across subgroups, $F(2, 45) = .06$.

The three reading condition subgroups of each age group were therefore comparable.

Material

The text we used, which was written to contain approximately equal numbers of features of interest to a burglar or a prospective homebuyer, is provided in Appendix A. This 454-word descriptive text, translated from English, contained 70 idea units, each corresponding to a new item of information (see Appendix B). These idea units were submitted to 150 raters (two thirds psychology undergraduates, one third adults aged 40-65 years) who rated them as *burglar* (Bg), *homebuyer* (By), or *other* (O) units, the latter contributing to the text's coherence. To be classified as Bg or By, an idea unit had to achieve agreement of at least 65% within each population of raters. Of the 70 idea units in the source text, 27.1% ($n = 19$) were deemed to concern the Bg perspective and 24.3% ($n = 17$) the By perspective.

Procedure

We sought to reproduce the reading conditions that older adults experience in their daily lives. Participants were seen individually and the procedure lasted about 50 minutes.

According to the original study procedure (Anderson & Pichert, 1978, Pichert & Anderson, 1977), the participant is first asked to read the text through once, carefully and silently, with no time limit or reference to the recall that will follow. A distraction task lasting 12-15 minutes is then administered (countdown, conversation about daily life), after which the participant is asked to recall the previously read text in writing. The participant is explicitly instructed to stay as close as possible to the source text, but if the exact words cannot be recalled, the participant can use his or her own words. The experimenter can do the writing if requested, as was the case for four of the older participants.

The text reading indication differs according to the condition: (a) explicit verbal instruction to adopt the target perspective (i.e., Burglar: Bg): “On my signal, you will turn over the page and read the text through once very carefully, as though you were a potential burglar, as this will help you grasp the ideas contained in the text”; (2) title: “… you will turn the page over and read the text through once very carefully. The story is entitled ‘Visit to commit a burglary’, which will help you grasp the ideas contained in the text” (unlike the verbal instruction, this title did not provide an explicit goal orientation but represented a more usual reading context); and (c) no reading indication: "…, you will turn the page over and read the text through once very carefully, to grasp the ideas contained in the text".

The choice of Bg as a target perspective was based on the results for young adults in the original studies. The perspective effects appeared more robust and marked for Bg, even if the results for the competing perspective (By) were also significant, showing that the By units were just as much a part of the text's macrostructure as the Bg units. By contrast, when it came to the match between these two competing perspectives and the content of the text, there were more reservations for the By perspective (e.g., Baillet & Keenan, 1986).

Measures

Each idea unit produced during recall was assessed according to the nature of the information it contained.

Relevant old (Anc) information concerned idea units contained in the source text and which were recalled in either identical (verbatim recall) or similar (i.e., expressed a little differently) form. We therefore counted the number of (a) Bg units, that is, units identical or similar to those classified as Bg that were contained in the source text, (b) By units, that is, units identical or similar to those classified as By that were contained in the source text, and (c) O units.

Relevant added (Ad) information was not contained in the source text, but was semantically consistent with it. We identified two categories, with reference to Denhière and Baudet (1992). *Logical inferences* (LIs) were units that had a truth value and were induced by logical implication. LIs either condensed several items of information contained in the text or else filled an implicit gap between units in the source text (e.g., "they go upstairs", "the father did some work in the house", "there is no one at home"). *Pragmatic (or enrichment) inferences* (PIs) were based on the formulation of hypotheses and thus

did not fill any gaps in the representation of the text's propositions (or text base). Instead, they were linked to general or typical knowledge about the situation to which the text referred (added information relating to knowledge of the world, classically included in the situation model) (e.g., "it smells bad in the basement", " the dining room's very tidy").

Depending on what they conveyed, the ILs and IPs were also divided into Bg, By and O categories.

False added (F) information was an error or a distortion of the source text (e.g., "Marc's mother has hidden a key", "children do not have school today").

The different steps of this analysis (coding of Anc, Ad, and F units, assignment of Ad units to Bg, By or O categories) were independently performed by five raters. When we compared their respective ratings (2119 units in total) we found an interrater agreement of 86%. There was disagreement over 297 units, which were discussed until a majority decision was reached. An example of this analysis is provided in Appendix C.

Results[3]

Number of Idea Units Recalled

A 2*3 ANOVA computed on the mean number of idea units, with age group (young, older) and reading condition (verbal instruction, title, no indication) as between-participants factors, revealed a significant main effect of age group on the length of recall, $F(1, 90) = 84.08$, $p < .001$. The recall of the older participants was significantly shorter (M = 14.04 idea units, SD = 6.07) than that of the young adults (M = 30.10, SD = 7.92) (see Table 1). However, there was no significant main effect

[3] Statistical analyses were performed using SYSTAT software.

of reading condition, $F(2, 90) = 1.70$, and no significant Age group * Reading condition interaction, $F(2, 90) = .09$). This is a classic observation of studies examining the effects of reading perspectives, as these effects are not quantitatively reflected in the length of recall but qualitatively, affecting the nature of the idea units that are recalled.

(Table 1 about here)

Recall Profiles

For each participant and each type of unit, we calculated the ratio of the number of units in a given category (e.g., Anc) to the length of recall (i.e., total number of idea units recalled). Performances were thus related to the length of the texts produced and were expressed, for each reading condition and for each age, out of 1 (or 100%; see Table 2).

The data highlighted differences in recall profiles between the young and older adults. A 2 (age group) * 3 (reading condition) * 3 (unit status: Anc, Ad, F) ANOVA computed on these weighted results[4] revealed (a) a significant effect of unit status, $F(2, 180) = 244.86$, $p < .001$ (65.62% Anc units > 29.17% Ad units > 5.21% F units); and (b) a significant Unit status * Age group interaction, $F(2, 180) = 56.18$, $p < .001$, where the proportions of Anc, Ad and F units varied according to age group. Post hoc tests (*t* tests) showed that older participants recalled proportionally fewer Anc units (52.23% vs. 79% for young adults, $p < .001$), and proportionally more Ad and F units (Ad: 39.40% vs. 18.93% for younger adults, $p < .001$; F: 8.37% vs. 2.07%, $p < .001$). These observations were valid across the reading conditions, as neither the Unit status * Reading

[4] The effects of age and reading condition are not shown (they could only be statistically nonsignificant according to the ratio applied in this section).

condition interaction, $F(4, 180) = 1.55$, nor the Unit status * Reading condition * Age interaction was significant, $F(4, 180) = 1.20$.

It should also be noted that the mean number of added units produced was comparable across the young and older groups: 6.03 added units (Ad + F) and 5.47 (Ad only) for the young adults versus 6.47 and 5.40 for the older ones (see Table 2).

(Table 2 about here)

Proportions of Target (Bg) and Nontarget (By) Units Recalled

These data are supplied in Table 3.

The ANOVA with age group and reading condition as between-participants factors, and unit (Bg, By) and unit status (Anc, Ad), as within-participants factors, showed no significant main effect of either age group or reading condition, and no significant interaction between these two variables, $F(2, 90) = 1.74$. Taken together, the Anc + Ad and Bg + By units represented on average 48.03% of recall for young adults and 47.97%[5] for older ones. However, the ANOVA did reveal (a) a significant effect of unit status, $F(1, 90) = 204.39$, $p < .001$, as Anc units were always proportionally more frequent than Ad units (see Recall Profiles section), and (b) a significant effect of unit, $F(1, 90) = 51.24$, $p < .001$ (mean Bg 31.25% > mean By 16.75%). The Unit * Age interaction was not significant, $F(1, 90) = .92$.

(Table 3 about here)

By contrast, the Unit * Reading condition interaction was significant, $F(2, 90) = 4.43$, $p < .05$. When a reading indication was provided, there was a greater difference between the proportions of Bg and By units that

[5] These percentages are around the *theoretical* mean (51.4%) of the original units of the source text classified as By + Bg (see Material section).

were recalled, compared with the control condition. For the whole experimental population, therefore, the reading indication appeared to play its role of activating representations in favour of Bg units, both Anc and Ad (the interaction with age was not significant). Thus, as in the original studies, it helped to differentiate participants' recall profiles with respect to the control condition.

Finally, with regard to age, there are two results worth underlining. First, the Unit * Unit status * Age interaction was significant, $F(1, 90) = 9.31$, $p < .01$. As shown in Table 4, the difference between the young and older adults concerned not the By units (Anc or Ad) but the Bg units, which represented a higher proportion of the Ad units produced by the older participants (young adults: $M = 3.7\%$, $SD = 3.41$ vs. older adults: $M = 11.3\%$, $SD = 5.57$; i.e., 3 times more), $t(df = 94) = 7.83$, $p < .001$.

(Table 4 about here)

Second, the Unit * Unit status * Age Group * Reading Condition interaction suggested an overall effect of processing, $F(2, 90) = 3.07$, $p = .050$. To explore this result, we first compared the Bg and By Anc units (Table 3, top row for each type of unit). The post hoc tests (*t* tests) confirmed that the Bg - By difference, expressed as a percentage of recall, increased significantly with a reading indication in the young group ($p < .001$ in both experimental conditions), but only with the title in the older group, $t(df = 30) = 5.81$, $p < .001$.

Regarding Ad units (Table 3, second row), the Bg - By difference was small (*ns*) in all three reading conditions for the young adults, but only in the control condition for the older ones. The difference was significant when the older adults were given a reading indication, $t(df =$

30) = 11.49 for the verbal instruction and $t(df = 30) = 11.10$ for the title, $p < .001$. This observation highlighted the importance of Ad (especially Bg) units in the age-related effects of the reading conditions.

To conclude this point, given the high standard deviations, especially among the older adults, we decided to examine individual performance profiles. By grouping the relevant units (Anc + Ad), we were able to examine the target versus nontarget unit recall profiles, to (a) identify the numbers of young and older people with the expected performance profile (Bg > By) in the two experimental conditions (2 x 16 participants per condition in each age group), and (b) assess any particular features of these recall profiles.

In the verbal instruction condition, 10 older participants (62.5% of the subgroup) displayed the expected Bg > By profile, compared with 15 young adults. In the title condition, 12 older participants (75% of the subgroup) exhibited this profile, compared with 14 young adults. It should be noted that some of the older adults did not produce any By units at all ($n = 2$ with the verbal instruction and $n = 6$ with the title; i.e., 25% of participants given a reading indication). We did not observe this in the young adults, and it also departed from the recall instructions given to participants (i.e., it is not a matter of recall only the information semantically related to the title or the verbal instruction). The Bg = By profile concerned the three remaining young adults ($n = 1$ with the verbal instruction and $n = 2$ with the title), and was also observed in the older adults ($n = 4$ and $n = 2$). Finally, the By > Bg profile, which went

against expectations, was only observed in the older group, with two cases in each experimental condition (i.e., 12.5%)[6].

Added Units (Relevant or False)

We examined the distribution of added units across the LI, PI and F categories, using the chi-square nonparametric test.

(Table 5 about here)

First, the distribution of added units across these categories was significantly age-related, $\chi^2(df = 2, N = 96) = 14.78$, $p < .001$. LIs accounted for 66.2% of the added units provided by the young adults versus 51.4% provided by the older adults, but the proportions of PIs and F units rose with age (for older adults, 16.6% of added units were F and 31.9% were PIs, compared with 9.1% and 24.7% for young adults). The statistical links with the reading condition were not significant.

We then examined the nature of the PIs, which reflected *enrichment* of the source text. These could be divided into two main categories (Table 5, bottom). Category A contained elaborations that provided additional information (relating to the characters, their actions, and goals, the physical environment, the causes and consequences of events, etc.) and had a truth value (or a high degree of plausibility) in view of the text content ("The boys are good friends", "There's a bad smell in the basement", "The dining room's very tidy"). Category B contained what were considered to be more general elaborations, whose veracity could not be determined ("The bikes are leaning against the garage wall", "Their father is traveling", etc.). This category included (a) Ad units we labeled '*news from perspective'* (NP), which were only produced in the

[6] For information, the By > Bg profile was observed in four older adults who had left school early without gaining any diploma. The Bg = By profile was observed in six older adults, two-thirds of whom had some form of school diploma.

two experimental conditions, as they were very closely related to the reading indication (“He encourages his friend to commit a burglary", "They try to find out the risks", "They are accomplices"), and (b) *attribution* inferences interpreting the characters' behaviour (e.g., “Marc is pretentious", "Pierre is amazed"). These idea units were produced only very exceptionally (n = 2 in the young group and n = 8 in the older group).

The analysis showed that the distribution of PIs across Categories A and B was not significantly related to the reading condition, $\chi^2(df = 2, N = 96) = 1.89$, but was age-related, $\chi^2(df = 1, N = 96) = 17.44$, $p < .001$. The proportion of Category A units was higher among the young adults (46.5% vs. 17%), while the proportion of Category B units was higher among the older adults (83% vs. 53.5%). The older adults therefore produced more elaborations involving referential knowledge that was relatively untargeted, about the text content (83 Category B units vs. 17 Category A units). Numbers were comparable across the two categories for young adults (33 vs. 38; see Table 5).

Finally, out of the 62 Category B units produced by the older adults in the two experimental conditions, 35 (56.4%) were NP units, compared with none for the young adults. We noted that older participants whose recall profile did not include any By units (n = 2 with the reading instruction and n = 6 with the title; see Proportions of Target (Bg) and Nontarget (By) Units Recalled section) systematically produced NPs.

Discussion

The purpose of this study was to examine the ability of young and older adults to : (a) use a reading indication to favour semantically linked information, and b) distinguish information in the text they had

actually read from information activated in memory. Overall, as in previous studies featuring explicit memory tasks, we observed an age-related decline in performance (e.g., Charlot & Feyereisen, 2005; Fleischman, Wilson, Gabrieli, Bienas, & Bennett, 2004), as recall of Anc units was significantly lower in the older group, regardless of reading condition. We also observed that young and older adults produced information that was both quantitatively and qualitatively different when they recalled *what was said* in a descriptive text.

Regarding our first aim, analysis of mean recall performances, weighted by production length, revealed that the reading indication played its role of schema activator in favour of Bg units (Anc + Ad) in both age groups. This resulted in different recall profiles compared with the control condition, thus contradicting the predictions of Hypothesis 1. In the older group, however, results showed that the effect of reading condition mainly concerned the production of Anc units, insofar as only the title elicited the differential recall of Bg and By units by older adults (Table 3). In other words, when a selective attention instruction was conveyed by semantic clues rather than as an explicit request (i.e., information to forget or remember; e.g., Zacks, Radvansky, & Hasher, 1996), the young adults were able to use it to differentially recall Bg and By units, but not the older ones. However, these additional results did not allow us to validate Hypothesis 1.

Only the analysis of the older adults' individual recall profiles seemed to suggest more frequent difficulty controlling potentially relevant information that did not meet the selection criterion (i.e., By units). Some recall profiles that were not observed, or only marginally, among the young adults were more common among the older ones,

namely the By > Bg and Bg = By profiles (37.5% with the verbal instruction and 25% with the title for the older group, compared with 6.25% and 12.5% for the young one.

Moreover, although the verbal instruction invited readers to relate the text content to themselves, as in the original studies (e.g., Pichert & Anderson, 1977), results did not support the *self-reference effect* that is supposed to enhance episodic memory in older individuals (e.g., Trelle & Henson, 2015). The somewhat *immoral* nature of the proposed role and the improbable connection with the content of the older participants' autobiographical memory may explain this observation.

Regarding our second aim and the associated hypothesis, the results showed that added units (Ad + F) represented a large proportion of the units produced by older adults, regardless of reading condition (about 48% on average vs. 21% among young adults). The older participants also produced more PIs (so-called enrichment inferences that specifically involve the reader's knowledge of the world), and these PIs were further removed from the source text (Category B) than most of those generated by young adults (Category A). Although, older adults may have exhibited spreading activation, associated with difficulty filtering information in WM, Hypothesis 2 was not validated as formulated, as the young and older adults generated comparable numbers of added units on average, whether or not a reading indication was given.

Results did, however, reveal a singular use of the reading indication among older participants, as we found a majority of NP units in both experimental conditions (56.4% of Category B units), whereas none were produced by the young adults. Their increasing presence with age

(especially when no By units were generated) is reminiscent of the *adherence* to the reading perspective observed in children with comprehension difficulties or young adults with a short memory span (e.g., Lee Sammons & Withney, 1991). These individuals presumably rely more heavily on the perspective to promote and organize their integration of textual information. As a result, it is more extensively used during encoding. In the older group, however, the added units rated as NP favoured the *semantic clue-referential universe of the reader* relation, to the detriment of the *semantic clue-source text* one supporting the integration of the original information contained in the text.

Thus, while the presence of a reading instruction or a title did not significantly modify the number of added units produced during recall by the older participants, relative to the control condition, it did affect the nature of the Category B PIs. We can, therefore, conclude that the reading indication constituted an effective aid for older readers, at least for the implementation of semantically oriented processing (see Table 3), although caution needs to be exercised if NPs are taken into account.[7] The recall performances of some of the older participants suggest that this particular type of added information is also an indicator (and perhaps the only relevant one in the present study) of impaired inhibition processes at the level of access to WM. *Adherence* to a reading perspective could be viewed here in terms of the intrusion of the reader's referential universe, to the detriment of the text information, which

[7]From this point of view, paralinguistic processes for signalling important information (underlining or introducing typographical features) may further promote the detection of this information while reading the text. In a text-reading task, Carlson, Hasher, Connelly, and Zacks (1995) showed that the presence of a perceptual indicator signalling the irrelevant information (text in italics) significantly helped older people to ignore it (see also Gaonac'h & Passerault, 1990). By contrast, a linguistic indicator such a title does not allow important information to be detected while reading the text, thus averting WM overload (pre- vs. post-reading inhibition).

nevertheless needs to be recalled *as accurately as possible* (e.g., when no By units are produced). In this case, referential knowledge tends to replace textual information. The hypothesis of a developmental change with age in the balance between *verbatim* (surface details) and *gist* (meaning or theme) processes put forward by Lövden (2003) was, therefore, supported here, as the older participants' recall seemed less precise and less demanding with regard to the content of the text they had actually read. The hypothesis of an associated source monitoring difficulty (new information supplied in a source text vs. referential information in memory) is also worth mentioning (e.g., Bell, Buchner, & Mund, 2008; Isingrini & Taconnat, 2008).

To sum up, it seems that relevant added information supported the young adults' recall of the source text, by filling in details that were not explicitly mentioned and establishing links between the textual information and their referential knowledge. Accordingly, these participants produced significantly higher numbers of LIs and PIs rated as *close to text content* (Category A) than the older participants did. The results for the latter suggest that their referential universe was elicited in a different manner, resulting in the production of more Category B units, including NPs, and fewer LIs[8].

How, then, should we interpret the higher proportion and nature of the added information produced by older adults? The hypothesis of an inhibition deficit affecting information filtering in WM does not appear sufficient to account for all the recall profiles we identified. Moreover, it was only when we calculated the ratio of added units to the length of the

[8] The difficulty older people have producing logical inference is well established (De Beni et al., 2003).

texts that the difference between the two age groups became significant, especially in view of the difficulties of episodic recall of the elderly.

Although the NP units should not be ignored, it seems relevant to suggest a different hypothesis emphasising the pragmatic and communicative dimension. This hypothesis postulates that older adults give more priority to the social meaning and interpretive dimension of a text than young adults do (see, for example, Gould, Trevithick, & Dixon, 1991). This may help to explain why text processing at the level of the situation model appears to be relatively well preserved in older adults (Radvansky, 1999; Radvansky & Dijkstra, 2007). It may also reflect a change in communicative goals with age. Older adults place the emphasis not so much on concisely and precisely rendering the source text, as illustrating the situation described, based on their referential universe (see Adams, Labouvie-Vief, Hobart, & Dorosz, 1990), but with the risk that the inferences they produce will preserve less of the textual content. That said, and perhaps because of the communicative goals they are supposed to favour, older adults can be regarded as *better narrators* than young adults (Kemper, 1994; Kemper, Rash, Kynette, & Norman, 1990; Pratt & Robins, 1991).

The hypothesis of a change in communicative goals with age may, therefore, help to explain the differential nature of the Ad units produced during recall. This change may also reflect a functional adjustment to the episodic recall difficulties encountered by older people, in order to meet the social demand for recall (e.g., Holland & Rabbitt, 1990, Lövdén, 2003).

In conclusion, an inhibition deficit could help to explain the recall of eight older adults in the verbal instruction condition and 10 in the title

condition (out of 16), relative to task demands. However, as shown by the individual recall profiles, some of these participants may have encountered a filtering difficulty when accessing WM (e.g., recall with no By units and organized around NP units, which was never observed in young adults), while others may have had difficulty controlling potentially relevant information that did not meet the selection criterion (hypothesis of the sustained activation of information in WM: By > Bg and Bg = By profiles, which were much more frequent in the older group).

As for the other older adults (who represented 37.5-50% of the subgroup, depending on the experimental condition vs. 87.5-93.7% for young adults), they generally managed to meet the task requirements. Although they exhibited explicit memory difficulties and produced more PIs, they preferentially produced Ad units linked to the reading perspective, where one was provided, taking the reading indication into account as far as possible (e.g., By units produced, but not NP units).

One essential finding was the extent of interindividual variability observed in the older group. We identified three distinct profiles, and although there were differences among the young adults, no such observation could be made (see Proportions of Target (Bg) and… section, last part). By studying off-target verbosity (OTV) in the oral productions of older participants, Pushkar et al. (2000) were able to show that different subgroups could be distinguished, at a given age, according to the level of OTV (high, medium or low). Moreover, results revealed that only older participants with a high OTV level were distinguished on cognitive (low inhibition in particular) and social measures (more self-centered, less interested in partner). In other words,

age and cognitive functioning were not related to conversational style in participants with medium or low verbosity.

As a consequence, indicators related to social behaviour, oral and written language experience, and metacognition (knowledge of the activity's cognitive and pragmatic functions) should also be taken into account. The aim of studies in this area is to better understand the resistance or vulnerability of the different psychological abilities with age (in production as well as in text memory) and to identify the conditions that allow the cognitive functioning of older individuals to be optimized. For example, research has already highlighted the positive effects of collaboration (collaborative memory) in reducing the frequency of memory errors in young and older adults (e.g., Ross, Spencer, Blatz, & Restorick, 2008: married couples performing memory tasks together or separately). Moreover, given the possible changes in communicative goals, supporting the link between memory activity and autobiographical experience (self-reference effect) may help to reinforce the various interventions available for older adults (support of preserved memory capacity and compensatory strategies, as well as spontaneous or induced other-regulation behaviour (see *social scaffolding*" notion and its modalities, Vygotsky, 1934).

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Table 1

Mean (Standard Deviation) Length of Recall by Age and Reading Condition

Age group	Young adults			Older adults		
Reading condition	Control	Verbal instruction	Title	Control	Verbal instruction	Title
Mean number of units (*SD*)	**31.9** (9.3)	**27.9** (7.5)	**30.4** (9.4)	**15.1** (7.3)	**11.7** (4.9)	**15.4** (8.1)
Range	19-47	15-42	13-43	7-34	6-21	6-32

Table 2

Percentage and Mean Number (Standard Deviation) of Each Type of Unit Produced by Age and Reading Condition

Age	Young adults			Older Adults		
Reading condition	Control	Verbal instruction	Title	Control	Verbal instruction	Title
Relevant units from source text (Bg + By + O)	**78.9** (10.7) 25.5	**81.5** (11.3) 22.9	**76.6** (11.8) 23.9	**57.2** (16.6) 8.7	**51.1** (17.8) 6.2	**48.4** (17.6) 7.9
Relevant added units (LI + PI)	**19.2** (9) 5.9	**17.5** (8.7) 4.7	**20.1** (9.7) 5.8	**31.3** (14.3) 4.8	**43.3** (15.6) 4.8	**43.6** (16.7) 6.6
False added units	**1.9** (1.9) 0.5	**1** (σ: 1.4) 0.4	**3.3** (2.5) 0.8	11.5 (3.8) 1.5	**5.6** (4.2) 0.8	**8** (5.3) 0.9
Total	100%	100%	100%	100%	100%	100%

Note. Bg = burglar; By = homebuyer; O = other; LI = logical inference; PI = pragmatic inference.

Table 3

Percentage (Standard Deviation) of Relevant Units Produced According to Age, Unit Status (Source Vs. Added) and Reading Condition

Age groups	Young adults			Older adults		
Reading Condition	Control group	Verbal instruction	Title	Control group	Verbal instruction	Title
Bg Anc units	**23.5** (3.8)	**32.6** (5.3)	**24.2** (3.8)	**20.4** (4.2)	**18.9** (5.1)	**23.2** (4.1)
Bg Ad units	**2.5** (2)	**3** (1.7)	**5.5** (1.3)	**5.5** (3.9)	**13.2** (2.3)	**15** (3.1)
Total	26	35.6	29.7	25.9	32.1	38.2
By Anc units	**17** (4)	**15.3** (3.2)	**13.7** (2.4)	**15.7** (3.3)	**14.3** (7.5)	**9.1** (8.8)
By Ad units	**2.9** (1.4)	**1.9** (1.7)	**2** (1.7)	**4** (3.9)	**1.9** (3.3)	**2.7** (3.6)
Total	19.9	17.2	15.7	19.7	16.2	11.8

Note. Bg = burglar; Anc = from source text; Ad = relevant added; By = homebuyer.

Table 4

Percentages of Burglar and homebuyer Units Produced According to Status (Source Vs. Added) and Age Group

Nature and status of units		Young adults	Older adults
Burglar units	Anc (*SD*)	26.8 (6)	20.8 (4.8)
	Added (*SD*)	**3.7** (2.4)	**11.3** (5.6)
Buyer units	Anc (*SD*)	15.3 (3.5)	13 (7.3)
	Added (*SD*)	2.3 (1.7)	2.9 (3.7)

Note. Anc = from source text. Percentages calculated according to ratio of burglar or homebuyer units (from source text or added) to total number of units produced during recall.

Table 5

Mean Numbers of False Added Units, Relevant Added Units (Logical or Pragmatic Inferences) and Category A or B Pragmatic Inferences, According to Age and Reading Condition

Age group	Young adults			Older adults		
Reading Condition	Control	Verbal instruction	Title	Control	Verbal instruction	Title
False units	**0.5**	**0.4**	**0.8**	**1.5**	**0.8**	**0.9**
Logical inferences	**4.5**	**3.3**	**4**	**3.1**	**2.6**	**4.2**
Pragmatic inferences	**1.4**	**1.4**	**1.7**	**1.7**	**2.1**	**2.5**
- Category A	0.8	0.6	0.7	0.4	0.3	0.4
- Category B	0.6	0.8	1	1.3	1.8	2.1

Note. The data for the false units are those in Table 2. Similarly, the logical and pragmatic inferences are subdivisions of the relevant added units shown in this table (see Recall Profiles section).

APPENDICES

Appendix A: Original text (Pichert & Anderson, 1977). The dialogues have been replaced with indirect speech in the French translation.

The two boys ran until they came to the driveway. "See, I told you today was good for skipping school," said Mark. "Mom is never home on Thursday," he added. Tall hedges hid the house from the road so the pair strolled across the finely landscaped yard. "I never knew your place was so big," said Pete. "Yeah, but it's nicer now than it used to be since Dad had the new stone siding put on and added the fireplace."

There were front and back doors and a side door which led to the garage which was empty except for three 10-speed bikes. They went in the side door, Mark explaining that it was always open in case his younger sisters got home earlier than their mother.

Pete wanted to see the house so Mark started with the living room. It, like the rest of the downstairs, was newly painted. Mark turned on the stereo, the noise of which worried Pete. "Don't worry, the nearest house is a quarter of a mile away," Mark shouted. Pete felt more comfortable observing that no houses could be seen in any direction beyond the huge yard.

The dining room, with all the china, silver and cut glass, was no place to play so the boys moved into the kitchen where they made sandwiches. Mark said they wouldn't go to the basement because it had been damp and musty ever since the new plumbing had been installed.

"This is where my Dad keeps his famous paintings and his coin collection," Mark said as they peered into the den. Mark bragged that he could get spending money whenever he needed it since he'd discovered that his Dad kept a lot in the desk drawer.

There were three upstairs bedrooms. Mark showed Pete his mother's closet which was filled with furs and the locked box which held her jewels. His sisters' room was uninteresting except for the colour TV which Mark carried to his room. Mark bragged that the bathroom in the hall was his since one had been added to his sisters' room for their use. The big highlight in his room, though, was a leak in the ceiling where the old roof had finally rotted

Appendix B: Sample Coding of Source Text Units

"There were front and back doors and a side door which led to the garage which was empty except for three 10-speed bikes."

1. there were front doors
2. there were back doors
3. there were a side door
4. the side door led to the garage
5. the garage was empty except for three bikes
6. the bikes had 10 speeds

Appendix C: Example of analysed recall (young adult, control condition)

“Pierre and Marc bike to Marc's house. They go back into the house. There are big barriers. There are three doors to enter the house. A door is always open in case his sisters return earlier than their mother. They play in the kitchen. They visit the rest of the house, the small living room where his father has his coin collection and paintings, the bedrooms upstairs and his mother's wardrobe filled with furs. Marc says he has all the pocket money he wants, he is pretentious. Marc also shows his own bathroom. His sisters have another near their room. In Marc's room, the light penetrates through a hole in the ceiling because the roof is old and rotten.”

Pierre and Marc ride a bike (F)

to Mark’s house (LI)

They come home (LI)

There are big barriers (O)

There are three doors to enter the house (F)

A door is always open (Bg)

in case his sisters return earlier than their mother. (Bg)

They play in the kitchen (F)

They visit the rest of the house (LI)

the small living room where his father has his coin collection (Bg)

and his paintings (Bg)

the rooms on the first floor (O)

and his mother's wardrobe filled with furs (Bg)

Marc says he has pocket money (O)

all he wants (O)

he is pretentious (PI)

Marc also shows his own bathroom (By)

His sisters have another (By)

near their room (O)

In Mark's room, light enters (O)

through a hole in the ceiling (By)

because the roof is old (By)

and rotten (By)

- Added units: 7 including 3 logical inferences rated other, 1 pragmatic inference rated other, and 3 false units
- burglar units: 5
- homebuyer units: 5
- Other units: 6

Total: 23 idea units

ANNEXES

Annexe A : Texte utilisé dans l'étude (d'après Pichert & Anderson, 1977)

Les deux garçons coururent jusqu'à ce qu'ils aient atteint l'allée du garage. Marc fit remarquer à Pierre que c'était une belle journée pour faire l'école buissonnière. Il ajouta que sa mère n'était jamais à la

maison le jeudi. De grandes barrières cachaient la maison de la route et les deux compères traversèrent rapidement le jardin arrangé avec goût. Pierre dit qu'il ne pensait pas que c'était si grand chez Marc. Ce dernier précisa que c'était plus joli maintenant, depuis que son père avait fait mettre le nouveau côté en pierre et la cheminée.

Il y avait des portes de devant et de derrière et une porte de côté conduisant au garage qui était vide, excepté trois vélos à dix vitesses. Ils entrèrent par la porte de côté. Marc expliqua que c'était toujours ouvert pour le cas où ses jeunes sœurs reviendraient à la maison plus tôt que leur mère.

Pierre voulait visiter la maison, aussi Marc commença-t-il par le salon. Comme le reste du rez-de-chaussée, il était fraîchement peint. Marc alluma la chaîne dont le bruit inquiéta Pierre. Marc lui dit de ne pas s'inquiéter, la maison la plus proche étant à 400 mètres au moins. Pierre se sentit plus à l'aise en observant qu'aucune autre maison ne pouvait être vue au-delà de l'immense jardin.

La salle à manger, avec toute la porcelaine de Chine, l'argenterie et les verres, n'était pas un endroit pour jouer, aussi les garçons allèrent dans la cuisine où ils firent des sandwiches. Marc dit qu'ils n'iraient pas au sous-sol, car il était humide et moisi malgré l'installation de la nouvelle plomberie.

Comme ils entraient dans le petit salon, Marc précisa que c'était ici que son père gardait ses célèbres peintures et sa collection de pièces. Marc insistait sur le fait qu'il pouvait obtenir tout l'argent de poche qu'il voulait depuis qu'il avait découvert que son père gardait beaucoup d'argent dans le tiroir du bureau.

Il y avait trois chambres à l'étage. Marc montra à Pierre l'armoire de sa mère qui était remplie de fourrures et la boîte fermée qui contenait ses bijoux. La chambre de ses sœurs était sans intérêt, excepté la télévision couleur que Marc emporta dans sa chambre. Marc insista sur le fait que la salle de bain dans le couloir était la sienne, puisqu'une autre avait été ajoutée à la chambre de ses sœurs pour leur usage. Toutefois, le gros rayon de lumière dans sa chambre était dû à un trou dans le plafond, là où le vieux toit avait finalement pourri.

Annexe B : Exemple de codage des unités du texte source

« Il y avait des portes de devant et de derrière et une porte de côté conduisant au garage qui était vide, excepté trois vélos à dix vitesses »

1. il y a des portes de devant
2. il y a des portes de derrière
3. il y a une porte de côté
4. la porte de côté conduit au garage
5. le garage est vide excepté trois vélos
6. les vélos ont dix vitesses

Annexe C : Exemple de rappel analysé (sujet adulte jeune ; condition Contrôle)

« Pierre et Marc font du vélo jusqu'à la maison de Marc. Ils rentrent dans la maison. Il y a de grandes barrières. Il y a trois portes pour rentrer dans la maison. Une porte est toujours ouverte au cas où ses sœurs rentreraient plus tôt que leur mère. Ils jouent dans la cuisine. Ils visitent le reste de la maison, le petit salon où son père a sa collection de pièces

et ses tableaux, les chambres à l'étage et l'armoire de sa mère remplie de fourrures. Marc dit qu'il a de l'argent de poche tant qu'il veut, il est prétentieux. Marc montre aussi sa propre salle de bain. Ses sœurs en ont une autre près de leur chambre. Dans la chambre de Marc, la lumière pénètre par un trou dans le plafond car le toit est vieux et pourri »

Pierre et Marc font du vélo (F)

jusqu'à la maison de Marc (IL)

Ils rentrent dans la maison (IL)

Il y a de grandes barrières (A)

Il y a trois portes pour rentrer dans la maison. (F)

Une porte est toujours ouverte (V)

au cas où ses sœurs rentreraient plus tôt que leur mère. (V)

Ils jouent dans la cuisine.(F)

Ils visitent le reste de la maison, (IL)

le petit salon où son père a sa collection de pièces (V)

et ses tableaux, (V)

les chambres à l'étage (A)

et l'armoire de sa mère remplie de fourrures. (V)

Marc dit qu'il a de l'argent de poche. (A)

tant qu'il veut (A)

il est prétentieux. (IP)

Marc montre aussi sa propre salle de bain.(Ac)

Ses sœurs en ont une autre (Ac)

près de leur chambre. (A)

Dans la chambre de Marc, la lumière pénètre (A)

par un trou dans le plafond (Ac)

car le toit est vieux (Ac)

et pourri. (Ac)

- Propositions ajoutées : 7 dont 3 inférences logiques (IL) reclassées A, 3 Fausses (F), 1 inférence pragmatique (attributionnelle) (IP) reclassée A.
- Propositions V (voleur) : 5
- Propositions Ac (acheteur) : 5
- Propositions A (autre) : 6

Total : 23 unités d'idée