

On the Adequacy of Verbal Protocols in Examining an Underlying Construct of a test

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Abstract

This paper investigates the usefulness of a verbal protocol approach in examining the underlying construct of a cloze test, i. e. the reasons that a test writer had for deleting some lexical items from a passage to construct a cloze test. The informants were asked to 'think aloud' while they were doing the cloze test. The observation of the informants verbalising their thoughts revealed inadequacies in using this approach. To compensate for this inadequacy, retrospection interviews in which the informants were asked about their choices after their verbal protocols, were conducted. The analyses of the informants' think aloud and their retrospection showed that they could not verbalize all the mental processes they utilized in taking the test in their think aloud. The results, however, suggest verbal protocols as useful instruments for collecting a particular type of data which cannot be accessible in using other approaches.

Key Words: Rhetorical relation, Elaboration, Concession, Verbal protocol, Retrospection interview, Construct validity.

1. Introduction

Mann and Thompson (1988) have developed Rhetorical Structure Theory (RST), a text generation model in which the rhetorical relations among parts of a text are described. Rhetorical relations, as Mann and Thompson (1988) explain, are the meaning links that a writer expects readers to establish between two non-overlapping parts of the text. Relational definitions constitute “the heart of RST” (Mann and Thompson, 1986: 87). A unique type of cloze tests based on passages extracted from a sociology textbook was developed to investigate the rhetorical relation introduced by Mann and Thompson (1988). It was assumed that the informants needed to establish a rhetorical relation between text spans in order to restore the deleted items. To examine this assumption, a verbal protocol approach was employed.

This paper, more specifically, aims to answer the following question:

To what extent is a verbal protocol approach able to provide appropriate pieces of data for examining an underlying construct of a test?

It should be noted that this study was limited to the investigation of the verbal protocols of three native speakers of English and the interview with them. The participants, it was assumed, represented undergraduate sociology and linguistics and postgraduate applied linguistics students. They had no language related problems. Moreover, to select the participants, no criteria such as cognitive and learning style, language learning and communicative strategies, were taken into consideration. The data collected for the purpose of this study could have been different if the participants were not competent in English or were selected on the basis of a cognitive, learning, or communicative style.

The following sections contain a general description of the approach employed in this study. Then, the arguments for removing the lexical items

from the text, that is the underlying theoretical construct of the test, will be presented. This will be followed by the analyses of the data the informants provided.

2. Review of related literature

The main objective of this study was to provide a description of using a verbal protocol approach and examining its implication in language testing research. Therefore, prior to reporting the results of the study, a general description of this approach is presented.

2.1. Verbal protocols

The debate on the use of verbal protocols can be traced back to the early years of twentieth century, when the use of introspective reports for research into mental processes obtained its legitimacy in the study of psychological processes. With the emergence of behaviourism, verbal protocols became less popular, but their use was revitalised by contemporary cognitive psychology (Erickson and Simon, 1984).

Despite the revitalisation of the verbal report method, conflicting views have been expressed about its eligibility for studying cognitive processes. Nisbett and Wilson (1977) for example, questioned the adequacy of verbal reports for inferring informants' mental processes . They found that their subjects were unable to give accurate and retrospective accounts of the processes underlying their behaviours. Commenting on the Nisbett and Wilson's (1977) study, Ericsson and Simon (1993) point out that the inaccurate verbal reports of the subjects in their study may not only be due to the subjects' lack of access to their mental processes but may also be due to "inadequate procedures for eliciting verbal reports, or requesting

information that could not be provided even if thoughts were accessible” (1993: 27, emphasis added).

In addition to Nisbett and Willson’s comment (1977) on the inadequacy of verbal protocol, some other researchers who have used this approach also point to some limitations of this approach. Reviewing verbal report research, Cohen (1994: 680-681) refers to the following criticisms that have been levelled by different researchers:

- inaccessibility of cognitive processing (Seliger, 1983),
- mismatch between the subjects’ verbal response and their natural thought processes (Ericsson and Simon, 1984)
- conversion of introspection into retrospection -- it takes 20 minutes to report on 11/2 seconds of mental processing (Boring, 1953),
- an intrusive effect of verbal protocol, e.g., possible distortion of the process of the task the subjects were asked to do (Mann, 1982),
- variety of verbal protocols according to the type of instructions given, the types of material used in collecting protocols, the nature of the data analysis (Olson, et al. 1984),
- the impact of the participants’ characteristics, e.g., their verbal skills, on verbal protocol (Olson, et al. 1984),
- possible differences or incompatibility in the spoken and written verbal reports (Afflerbach and Johnston, 1984),
- alteration of the original thought processes if respondents do a task in a target language and report on it in their L1 or another language (Faerch and Kasper, 1987).

Despite these limitations, researchers in psychology and education recommend the use of verbal reports for the purpose of detailed examination of the information that people attend to while performing tasks. This type of

information, as Ericsson and Simon (1993) and Cohen (1994) have noted, is only accessible to researchers using the verbal report method.

Ericsson & Simon, (1984) consider verbal protocol analysis as a way to gain information about a participant's cognitive process. They believe that participants' verbal reports can bring thoughts into consciousness and make ideas verbal if needed. Wilson (1994) also believes that people's conscious thoughts can be accessed by their verbalization. Pressley and Afflerbach (1995: 2) argue that "spoken language is the data used in protocol analysis and the richness and variability of language are the greatest assets and liabilities of the verbal reporting methodology." Finally, Ransdell (1995) acknowledges that think aloud can provide information to test hypotheses and models of behaviour.

It should be mentioned that researchers do not consider verbal report as a single research method (Cohen, 1984, 1994,1995; Ericsson and Simon, 1980, 1993). As they suggest, it includes various techniques of self-report, self-observation, self-revelation for collecting data about the thoughts or cognitive processes of the participants in a study. Depending on their purpose, researchers may use one of these techniques or a combination of them to accomplish the objectives of their investigation.

2.2. Verbal protocols and language education research

Ericsson and Simon (1993) have presented a comprehensive list of studies in which various techniques of verbal protocols have been employed in language related studies. These techniques have also attracted the attention of researchers in general areas of language education such as text comprehension (Whitney and Budd,1996), writing (Hayes and Flower, 1983; Ransdell, 1995) and problem solving (Stratman and Hamp-Lyons,

1994: 89). They have also gained increasing prominence in the study of cognitive processing (i.e., L2 text comprehension). Trabasso and Magliano (1996), for example, employed verbal protocols to investigate the kinds of information, i. e. paraphrases, associations, explanations, and predictions available to consciousness during comprehension and the way they are used inferentially to construct the meaning of text. Moreover, verbal protocols were found useful in examining individual differences in comprehension and representation of narrative text (Long and Bourg, 1996; Zwaan and Brown, 1996). Zwaan and Brown (1996), for instance, collected verbal protocols from skilled and less skilled readers as they comprehended a story.

Think-aloud protocols, a variant of verbal protocols, were widely used to explore successful and unsuccessful strategies employed by learners at various proficiency levels when they encountered unknown words in the L2 (Bensoussan and Laufer, 1984; Block, 1986; Haastrup, 1987, 1990, 1991; Haynes, 1993; Morrison, 1996; Parikbakht and Wesche, 1999; Walker, 1983). Haastrup (1987, 1990, 1991), for instance, analysed 62 pair think-aloud protocols of Danish-speaking learners of EFL in order to find the range of inferencing procedures they employed.

Soria (2001) used think-aloud methodology to investigate how informants infer on their own accord. Having realised certain shortcomings of this approach such as incomplete reporting and the difficulty involved in interpreting protocols, Soria (2001) employed retrospective interviews as suggested by Haastrup (1987, 1990, 1991). Such interviews, as Soria (2001) found, provide a chance for the researcher to ask for “clarifications” and “further information” about some of the statements made during the thinking-aloud. The interview data can potentially improve the reliability of the protocol analysis. Oster (2001) has employed think-aloud in two-pronged

way: both as an assessment and as instructional tool in a heterogeneously grouped reading and language art classroom.

2.3. Verbal protocols and language testing research

Language testers have considered the use of verbal protocol approaches for various purposes of their studies. Waern (1982a, 1982b, 1985) used a think aloud method for a cloze task in which the subjects were asked to interpret either a given and unfamiliar word in context or suggest a word for the gap. Waern (1988), referring to previous word completion studies, emphasised that "the think aloud protocols gave excellent indications of the strategies chosen for interpretations" (1988: 343).

In another study, Nevo (1989:200) used verbal protocols of test takers to investigate the "processing of reading comprehension tests in the first language as compared to the target language, and to ascertain the cognitive strategies used by the respondents when taking the test". In a departure from studies reported in Cohen (1984), in which the test takers reconstructed the strategies that they employed to answer the tests after they had completed the whole test, in Nevo's (1989) study the test takers reported their strategies after each item. Nevo's (1989) study presented a methodological improvement in the use of verbal protocols as test takers talked aloud about the way in which they had processed the item immediately after completing it.

Finally, Anderson (1991) employed verbal reports for examining individual differences in strategy use by adult second language learners "while engaged in two reading tasks: taking a standardised reading comprehension test and reading academic texts" (Anderson, 1991: 460).

While some researchers have clearly adopted the verbal protocol method,

critics have questioned the implication of the methods referring, among other things, to their intrusive effects. In other words, they argue that verbal reports do not represent actual performances of the subjects, as they interrupt the processes being examined (Mann, 1982; Dorbin, 1986). Anderson (1991: 470) rejected the intrusive effect of verbal reports because the difference between his subjects' scores in the two administrations of the standardised test under "standard operational conditions" and "in connection with the participants' verbal report" was not statistically significant. He considered verbal reports and think-aloud protocols to be "more useful tools for gathering process data" (Anderson, 1991: 471).

Despite the strong arguments for and against the implication of verbal protocols, this study aims to re-examine the usefulness of verbal protocols in examining a unique construct of a test.

3. Method

3.1. Subjects

An undergraduate linguistics student (UL), an undergraduate sociology student (US), a postgraduate applied linguistics student (PAL) and a language testing specialist (TS) participated in this study. All participants, except the TS, were native speakers of English. The TS was an experienced English language teacher and a researcher in language testing. It was assumed that the participants represent the discipline they belong to. The participants were asked to verbalise what came to their mind while they were making a choice for the deleted lexical items. The informants performed the verbalisation task in separate sessions and their verbal protocols were recorded, transcribed and coded.

3.2. Instrument

The instrument used in this study was a cloze test developed on the basis of the assumptions underlying RST. In order to construct the tests some lexical items that were judged to play a role to indicate a rhetorical relation in terms of the guidelines presented in RST (Alavi, 1997), were deleted from the text. The rationale for restoring two deleted items will be described below.

3.2.1. Introspection in developing rhetorical relation cloze tests

The passage that was used in this study is appeared in Appendix (1). Following the tradition of RST, it was divided into some units. A “rhetorical relation” exists between any single pair of units known as “nucleus” and “satellite”. In this paper, an Elaboration and a Concession rhetorical relation that were judged to exist in the first five units of the text, were examined. The definition of these rhetorical relations as presented in Mann and Thompson (1988) appears in Appendix (2).

The first four units of the passage refer to the "interdependence" of social system, the main idea of the passage. The noun “interdependence” which is a key word in the text was removed from unit two as it is a direct reference to the central point of sentence one, that is, the "interdependence of component parts of society." The noun “system” was also removed from unit two because it is a label for the interdependence in technical language. According to the principles of RST, units two and three have an Elaboration relation with unit one. An Elaboration relation also exists between units three and four.

In units three and four the writer compares the social system with the animal body in order to simplify the understanding of the inter-relatedness of

the component parts. In unit five the writer qualifies what was mentioned in units three and four. Therefore, the rhetorical relation of unit five with units three and four, according to RST guidelines, is Concession.

In order to restore the first two items, it was assumed that the subjects need to realise the direct reference and the specification of the main point of unit one and establish a rhetorical relationship between these units. Restoring items 3 and 4 requires the informants to realise that units 3 and 4 contain further details of units 1 and 2. This implies that the informants establish an Elaboration relation between these units. The informants also need to find a kind of incompatibility between the points made in unit 5 and that of units 3 and 4. In this case, according to RST guidelines, they construct a Concession relation between these units. The following section contains a small portion of the data that were collected by means of a verbal protocol and a retrospection interview to investigate the rationale for removing five lexical items, i. e. the construct validity of the tests.

4. Results and Discussion

As mentioned above, two types of qualitative data were collected in this study. The first type of data, verbal protocols of the informants, was elicited at the initial stage of the study. The second type of the data was the points the informants made in their retrospection interviews that was carried out after their verbal protocols.

4.1. Verbal protocol data

This section contains a description of the observation of the informants and their think aloud while they were trying to restore the first five missing lexical items of the passage.

The US, the undergraduate sociology student, started reading the text. As he arrived at item 1 he suggested "situation" and promptly suggested "system" for item 2. He continued reading and put, without any delay, "organism" for item 3. He thought a few seconds (without saying anything) and put "simultaneously" for item 4. Having had silent reading for a couple of minutes, he read sentence four with "analogies" in blank 5.

The UL, the undergraduate linguistic student, read the text and suggested "fact" for item 1 and "hierarchy" for item 2 without verbalising her thought. She continued reading the text with the restored words. In her second reading of the text she replaced "fact" with "network". She suggested "organism" for item 3 and "together" for item 4. She tentatively put "example" for item 5 and argued:

(1) Like most examples? (pause) this is not the word I want but ...

Contrary to the inadequate verbalisation of US and UL, the verbal protocols of TS and PAL were informative enough to examine the question formulated in this study. An account of their verbal protocols appears separately in the following sections.

4.1.1 Think aloud of TS

The TS, the testing specialist, put "feature" for item 1 without verbalising his thought. He came back to the item in his subsequent readings of the passage, but he did not change his choice. He read through items 2 and 3 and commented:

(2) The text and the subjects are somehow unfamiliar. I find it more difficult to relate it to language.

The TS read the text from the beginning. He left item 3 blank, put "together" for item 4 and suggested two words, i. e. "analogies" and

“perhaps,” for item 5. He argued:

(3) I think, probably, because there is an assumption that this is misleading still they’re getting use the same analogyIt’s however after all.

The TS did a fast reading of the whole text for the third time. In his third reading, he suggested "system and framework" for item 2. He preferred "system" for this item and continued reading sentence three. He stopped on item 3 and paid attention to the comma but preferred not to make a choice for this item.

The TS read the text from the beginning for the forth time. At this stage, he was either confirming the words he put in the slots or changing them or restoring them. To confirm “feature” he said, “there is a synonym here”; for the social system, he commented “perhaps it is system after all. It refers back to it.” With regard to item 3 the TS first suggested "interrelationship" and read the text from the beginning again. He noticed the indefinite article “an” and asked himself "Isn’t interdependence a much better word?" and started reading from sentence two. After reading some part of sentence three, TS said:

(4) This is not gonna be interrelationship; this is gonna be something biological perhaps.

The TS then finished sentence three and said “so number three is "organism".

4.1.2 Think aloud of PAL

While restoring item 1, PAL, the post graduate applied linguist, said:

(5) Number one, I think, is word like phenomenon, some abstract noun seems to correspond with the features in the previous sentence, so I put

phenomenon for that.

To fill item 2, PAL said:

(6) Well, I don't know the technical language. Again in the previous sentence the word seems to be connected with interrelation, interdependence, and so. I don't know the technical language. I guess it interdependent. Interdependence is concise.

PAL verbalised his thought while he was restoring item 3 as:

(7) I need a word beginning with a vowel and noun some kind, just looking to the sentence and paragraph as a whole talk about organs and organism with beginning a vowel will seem to fit as organism.

To restore item 4, PAL referred back to previous parts of the passage and said:

(8) This interdependence-interrelationship aspect seems to work together. So I put together here.

PAL read unit 5 and said:

(9) This kind of comparison suggests metaphor.

4.1.3. Findings

The rapid performance of US in restoring the first three items implies that he was familiar with this type of text and his background knowledge helped him to make a choice for the missing lexical items. As the point UL made in (1) indicates, she, contrary to US, had a challenge with the text and the reconstruction processes. Moreover, she was not satisfied with the choice she made for item 5.

The TS, as he said in (2), was not familiar with this type of text and left majority of gaps blank in his first and second attempts. The think-aloud of the TS, as appeared in (3) and (4), did show that he established a kind of

meaning relation between various units of the text in order to make a choice for the items. This indicates that linguistic knowledge can potentially compensate for the lack of background knowledge in restoring a missing lexical item of the passage. He tried to read the whole passage actively and construct meaning during the processes of his reading activity. His verbal protocols revealed that he employed both linguistic and non-linguistic clues of the text in his challenge with restoring the missing lexical items.

The PAL, as indicated in (5), (6) and (7), focused on the relationship within and between units of the text and employed his linguistic awareness in restoring items 1, 2 and 3. The points made in (8) and (9) indicate that the meta-linguistic knowledge of PAL helped him suggest a choice for items 4 and 5.

4.2. Retrospection data

The informants' verbal protocols were informative to some extent. They, however, did not provide adequate data to fulfil the objectives of the study, i. e. to validate the underlying assumptions for the deletion of these lexical items. Two participants, US and UL, just restored the missing lexical items and did not express their thoughts. Even PAL and TS did not verbalise their thoughts properly and filled some gaps without expressing their thoughts. Therefore, to fulfil the objectives of the study, some complementary pieces of data were needed. To achieve this, each informant was invited to a retrospection interview that was carried out just after verbal protocols. In these interviews, the informants were asked to clarify the points they had made or to talk about their choices for the gaps. A description of the informants' retrospection appears below.

4.2.1. Retrospection of US

The verbal protocol of US, as mentioned above, was disappointing. He did not verbalise his thoughts while he was completing the tests. In the retrospection interview, however, he said that the previous sentence helped him to complete item 1. He also argued that his knowledge about “machine organic analogy”, and the points made in units three and four helped him to complete item 2. He commented:

(10) I know about machine organic analogy I know about society being referred to the social system.

To justify his reason for completing item 3 with “organism” he said

(11) I had the machine organic analogy and because of this bit here liked animal bodies.

He argued that the idea and the meaning in the passage helped him put “simultaneously” and “analogy” for items 4 and 5 respectively. He reasoned:

(12) What the previous sentence says is an analogy.

Contrary to the verbal protocol of US, his retrospective data indicates that he used various sources of knowledge to suggest a word for the missing lexical items.

4.2.2. Retrospection of UL

UL focused more on completing the tests instead of verbalising her thoughts. To access her thoughts, she was asked some questions about the relationship that exists in the text and the choices that she had made. UL found it difficult to explain the relationship between the first sentence in the text. However, with regards to her choice for item 1, she said:

(13) It follows the first sentence; it is talking about the relationship

between the component parts of societies. So, another word for that would be 'interrelation'.

She suggested “network” for item 2 and argued that her choice is a technical word in sociology. She said:

(14) It relates back to the previous sentence as well.

To elaborate on her choice for item 3, UL said

(15) The sentence takes the view made in the previous sentence further; it goes on. So, it refers back to that.

Concerning the relation between units three and four and units one and two, she said:

(16) I suppose they are saying the same thing as the first sentence.

With regard to her choice for item 4, i. e. “together,” she reasoned:

(17) I put together, because it relates back to all these words which give the feeling that many parts coming together as one body. So, I suppose it is repeating; it is emphasising that one point over and over again.

To justify her choice for item 5 you, i. e. "examples," she said:

(18) I am not happy with that word. Instead of putting examples I've thought there are more than one words I can put there. They are metaphors. Like most of different ways each sentence is a different way of saying the same thing.

When she was referred to words such as “comparison” or “analogies”, she promptly said “that was the word I was looking for.” This reveals that UL faced with a mental block in the process of restoring item 5 both during her verbal protocol and in her retrospection interview.

4.2.3. Retrospection of TS

The verbal protocols of TS suggest that he had established a kind of

relationship among units of the text to fill the gaps. He elaborated on this at the interview as:

(19) In fact, when I first read it I had no idea what I had read. It was very much at the sentence level and the sentences themselves sometimes did not seem to me make sense. I went through them over and over again. I was trying to link things together and as you have seen there were a few words that could only be found that way. It was so obvious once I realised the relationship between the two sentences, which is obvious actually and I should have realised that in the first place. Not the relationship between sentences, but the whole thing is a very coherent text, I guess.

Concerning his choice for item for item 4, i.e. "together", TS commented:

(20) As far as I can recall. I think I got it in the first place. Because, the thing seems to be very obvious from the sentence itself. There are various organs all work something (He used something for the blank) to keep the animal alive. If these things work, they work together. The way that I got it was just realise the meaning of the sentence. When I was re-reading the text for the second time it made ever more sense that it is a brilliant analogy that animal body things that reinforce number 4.

4.2.4. Retrospection of PAL

To explain how he made his choices for the first two items, PAL said

(21) In number one and two you couldn't do without the previous sentence. You might realise that number one is a noun and two is a noun as well, even an abstract noun, but your clue that what fills the gap comes from the previous sentence and the rest of the passage as well. So, I think, although I might not have exactly the right words the meaning of it must be on that line. I think

PAL suggested “organism”, “together”, and “metaphor” for items 3, 4 and 5 respectively. In the retrospection interview he explained:

(22) First of all item 3 needs a noun beginning with vowel. Just read the next couple of sentences it talks about organisms and body part and it looks like organism just from the context and not just that sentence but the next one as well. I have heard about social system described in organic terms and as machines so I can fit it with my preconceptions of metaphors for society anyway.

To argue for his choice for item 5, i. e. “metaphor” he said:

(23) I have read a book called 'Images of organisation' which looks at society and organisations specially in metaphorical terms. And that influenced me as well. This passage seems to be of the same sort of metaphorical description.

4.2.5. Findings

The informants’ retrospection interviews provided further pieces of evidence that were hidden in their verbal protocols. These retrospections could reveal the informants’ reasoning and the processes they followed in reconstructing meaning from the text and restoring the missing lexical items. US acknowledged that he had established a kind of relationship between units of text to restore the missing lexical items. The retrospections of UL, as appeared in (13)-(17) demonstrate that she, similar to US, constructed an Elaboration relation between units in which the first four lexical items were deleted. The point she made in (18) also indicates that she realised the incompatibility of the views made in unit (5). This implies that she established a Concession rhetorical relation. In other words, the retrospection interviews of two undergraduate informants demonstrate that

they reconstructed the Elaboration and Concession rhetorical relation between units of the text.

The retrospection interview of TS and PAL supported their think aloud protocols. Moreover, the points made by TS in (19) reveals his challenge in finding a coherent relationship between the content of the text that could provide him clues to restore the missing lexical items. The retrospection of PAL in (21) also reconfirms his think aloud protocols in which he referred to the linguistic and discoursal features of the text to restore the first two items. Finally, the points made by TS in (20) and by PAL in (22) and (23) were consistent with their think aloud protocols indicating the usefulness of retrospection data for examining the consistency of the informants responses.

5. Conclusion

The main reason for using think aloud protocol as a method of research in this study was to access the mental process of four informants while they were restoring missing lexical items. Verbal protocols, in this study, were found to be useful to some extent in examining the reasons for constructing a test, i. e. the construct validity, and the processes in restoring a missing lexical item. The observation of the informants' think aloud and the choices they made for the slots implied that they used two major strategies, i. e. forward and backward reading, and employed textual and contextual clues, in order to complete the gaps in the texts. The common purpose for undertaking these strategies as they mentioned in the interview, was to find a relation between different parts of the texts. This, however, was not explicitly verbalised in their verbal protocols.

This study supports the findings of Long and Bourg (1996) and Zwaan

and Brown (1996) and showed that verbal protocols are practical in detecting individual differences in their attempts to restore missing lexical items. While similar patterns can be found in the verbal protocols of the informants', this study revealed that they are also affected by the informants' field of study and their level of education.

The findings of this study are in line with those studies in language education in which verbal protocols were employed as an instrument. This study showed that verbal protocol was potentially able to produce reliable results (Ericsson & Simon, 1980) that could be clarified by another approach, e. g. retrospection interview. The participants in this study concentrated on the task they were supposed to do during the verbalisation of their thought (van Someren, Barnard, & Sandberg, 1994). This implied that verbal protocol approaches could be particularly useful in task-oriented activities that allow some confirmation of what learners actually do (Haastrup, 1987; Long & Bourg, 1996; Whitney & Budd, 1996). This study also revealed that verbal protocols can uncover the participants' access to their procedural knowledge (Haastrup, 1987) during their verbalisation.

This study also supports the main inadequacy of the verbal protocols, i. e. the time lag between the mental process and the verbal report of this process. It was revealed at the initial stage of the study that the informants completed a gap without verbalising the process they followed for making their choice. Nor did they say much about the inter- or intra-sentential relationships in the text while they were doing the tests. In other words, the relationship between the units of the text was not highlighted in the verbal protocols of the informants to infer a rhetorical relation of text units. This might suggest that the informants completed the gaps without relating the unit of the texts to each other.

To add to our understanding of the role of inter-sentential and intra-sentential relationship in helping the informants to restore the missing lexical items, the informants were interviewed. The retrospection data was also valuable in examining the consistency and correspondence between the initial reasoning for making choices for the gaps and the explanation, justification and clarification of these choices.

With respect to the five items that were examined in this paper, the verbal protocols of PAL reveals that he concentrated on the linguistic features of the text and found a lexical reference of the items in the previous unit. His explanation during the retrospection interview, however, showed that he established a relationship between the units of the texts in general and between the adjacent units in particular to make a choice for the slots in the text. This implies that the linguistic background of PAL was the major asset for him in making a choice for these gaps. The points PAL made in the retrospection interview, as stated in (22) and (23), suggested that linguistics knowledge by itself was not enough to fill these gaps.

The verbal protocols of TS did not show that the inter-sentential or intra-sentential relationships in the text might have helped him fill the slots in unit two. However, what TS mentioned during the retrospection interview revealed that he tried to connect the points made across the passage to each other in order to make appropriate choices for the gaps.

It was not clear in the think aloud of US that a sort of connection was established between units of passage. However, the retrospection interview with US revealed that, firstly, he established a relationship among units of the text in order to do the tests; and secondly, he employed his sociology knowledge to restore a lexical item for the slots.

The verbal protocols of UL did not illustrate the procedure she followed

in filling the gaps. However, the points that she made during the interview reveal that in order to make a choice for the gaps in the text, she, similar to the other three subjects, established a relationship between units of the text.

This study, as van Leuven and Wang (1977) suggest, showed that verbal reports provide “a partial but incomplete picture” of what participants are thinking about. It might be assumed that the participant’s reasoning could not be reflected properly in the verbal protocol data. Or, they could not verbalise their thought and their reason while they were doing a mental activity such as suggesting a word for the gap in the text. A closer examination of the participants’ verbalising their thought, the changes they made in the choices they had already made, and the analyses of their choices, however, could imply that they had a reason for their choice. But, it was not clearly presented in the verbal protocol data. This needed to be explored in order to accomplish the objective the study. To probe the informants’ reasoning which was missing in the verbal protocol data an unstructured retrospection interview technique was employed. The points the subjects made in their think aloud were used as the question prompts in the retrospection interview. The retrospection interviews revealed that the informants integrated different types of information in various units of the text for a better understanding of the content, suggested a lexical item for the slot that matched with the local or the global context of the units more appropriately, and utilised different sources of information, i. e. background knowledge, general knowledge, contextual knowledge, textual clues, and familiarity with the style of writing in order to confirm, reject, or modify the choices he had already made

The retrospection data provide evidence that was not accessible in the verbal protocol data. The retrospection interview data could help researcher

elicit the subjects' reason for restoring a missing lexical item. In other words, the informants' retrospection data could be considered as confirmation or clarification of what the informants said or failed to say during their think aloud.

5.1. Implications

It appears that verbal protocols can be employed for various purposes in almost all areas of language education. This study proposes that language policy makers can employ the findings of verbal protocols in testing their hypotheses and evaluating the expected outcomes of a language programme at various stages of developing, piloting, and implementing a program. Moreover, verbal protocols can also be used in the evaluation of a particular aspect of language programs such as the suggested textbooks or classroom practices.

Verbal protocols can help language teachers to examine their own teaching-practice beliefs and those of experienced/ inexperienced and successful/ unsuccessful colleagues. They can also use their learners' verbal protocols to explore the effectiveness of their teaching practices, the advantages/ disadvantages of textbooks and classroom activities, and the achievement of learning and teaching objectives.

Finally, language testers can use verbal protocols in examining the processes of test construction, construct validation of various test formats developed for various skills and components of language, and test taking strategies of test takers with various degrees of language abilities.

5.2. Suggestions for further research

This study revealed that both general and specific knowledge contributed

to restoring a missing lexical item to establish a rhetorical relation between units of the text. Further studies are needed to explore the predictive power of these two sources.

It is widely believed that language learners can be classified in terms of their cognitive and meta-cognitive learning styles and strategies. A possible line of research seems to be an examination of the verbal protocols of participants with different learning and cognitive styles in the processes of restoring a rhetorical relation of text units.

The participants of this study were competent both in general English and in academic discourses. A promising line of research will be an investigation of the verbal protocols of participants with different degrees of language ability in restoring a rhetorical relation of text.

Finally, this study can be replicated in a foreign language learning context. The participants can be asked to use their first and second languages to verbalise their thoughts in restoring a rhetorical relation of text units.

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Appendix 1

The passage extracted from a sociology textbook (179 words 14 items)

Sentence	Unit	Text
1	1	One of the outstanding features of societies is the way in which component parts are highly interrelated, or <i>interdependent</i> .
2	2	This (1-interdependence) is often expressed in technical language in terms of a social (2- <i>system</i> .)
3	3	Or, sometimes, the social system is described as an (3- 'organism'.) societies being likened to animal bodies
	4	in which the various organs - heart, liver, lungs – all work (4-together) to keep the animal alive.
4	5	Like most (5-analogies,) the model of the organism can be misleading if used too literally.
5	6	There <i>is</i> , (6-however,) something system-like about social (7-organisation,) with one institution affecting many of the others.
6	7	Thus, for instance, the social organisation of work (8-affects) the way education is organised, (9-changes) the role of the family in bringing up children, and (10-results) in the unequal distribution of income and wealth.
7	8	It is this, the (11-interdependence) of social institutions,
	9	which makes sociological (12-explanation) so difficult and complicated.
8	10	If one (13-part) of the mosaic changes
	11	then the whole (14-pattern) is altered,
	12	making it difficult to pin-point a single cause of any particular event, process or change.

Appendix 2

Definitions of the Elaboration and Concession rhetorical relations
(Adapter from Mann and Thompson, 1988)

Rhetorical relation	Definition
Concession	<p>Constraints on N: W has positive regard for the situation presented in N</p> <p>Constraints on S: W is not claiming that the situation presented in S doesn't hold.</p> <p>Constraints on N + S combination: W acknowledges a potential or apparent incompatibility between the situations presented in N and S; W regards the situations presented in N and S as compatible; recognising that the situations presented in N and S as compatible; recognising that the compatibility between the situations presented in N and S increases R's positive regard for the situation presented in N</p> <p>The effect: Reader's positive regard for the situation presented in N is increased</p>
Elaboration	<p>Constraints on N + S combination: S presents additional detail about the situation or some element of subject matter which is presented in N or inferentially accessible in N in one or more of the ways listed below. In the list, if N presents the first member of any pair, then S includes the second:</p> <p>1. set: member 2. abstract: instance 3. whole: part. 4. process: step 5. object: attribute 6. generalisation: specific</p> <p>The effect: R recognises the situation presented in S as providing additional detail for N. R identifies the element of subject matter for which detail is provided</p> <p>Locus of effect: N and S</p>
Abbreviations	N: Nucleus, S: Satellite, W: Writer, R: Reader