

## Facilitation of the Comprehension of Written and Spoken Discourse:

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*The purpose of this paper is to provide an overview of studies that have investigated the role of the establishment of discourse connections and the detection of inconsistencies between prior knowledge and new information on the facilitation of the comprehension of written and spoken discourse. With this aim, we will first describe studies on written discourse that have examined the effect of increasing the establishment of discourse connections by implementing text revision procedures, and studies that have tested the contribution of promoting the detection of inconsistencies between prior knowledge and new ideas by presenting refutation texts. Next, we will introduce preliminary studies on spoken discourse that have examined the effect of the establishment of a high number of causal connections and the presence of discourse markers, and studies that have tested the contribution of promoting the detection of inconsistencies between prior knowledge and new ideas by making explicit that incorrect ideas will be introduced in a conversation. This overview will allow us to propose contributions that studies on the comprehension of discourse presented in both modalities can make to student learning.*

The comprehension of discourse is central for student learning (McMaster, Espin, & van den Broek, 2014; Sparks & Rapp, 2010; van den Broek & Espin, 2010). Previous studies suggest that it involves the establishment of connections between adjacent and distant statements (e.g.: Cevalco & van den Broek, 2013, 2016; van den Broek, 1990, 1994, 2010; Zwaan & Rap, 2006), and the detection of inconsistencies between comprehenders' prior knowledge and ideas that are part of the discourse that is presented to them (van den Broek & Kendeou & 2008; Zwaan & Rapp, 2006).

Given its relevance for Education, several studies have examined what variables can promote discourse comprehension. These investigations have tended to focus on written discourse (Cevalco & van den Broek, 2013, 2016; Ferreira & Anes, 1994; Zwaan & Rapp, 2006). Some of them have examined the facilitative effect of increasing the establishment of discourse connections among statements by implementing text revision procedures, and some have explored the contribution of promoting the detection of inconsistencies between students' prior knowledge and text ideas by presenting them with refutation texts. These studies make an important contribution, given that they examine the effect of applying established guidelines to modify text structure on comprehension (Linderholm et al., 2000. For studies that have looked at the effect of other

variables on the facilitation of discourse comprehension see Kendeou, van den Broek, Helder, & Karlsson, 2014; McMaster, Espin, & van den Broek, 2014). In comparison, little attention has been paid to the study of what variables can facilitate the comprehension of spoken discourse. This issue needs to be addressed, given that classes are taught through the spoken discourse of the teacher or professor, and his or her verbal interaction with the students (Cevalco & van den Broek, 2013, 2016; Flowerdew & Tauroza, 1995; Waring, 2013). In spite of this gap, some preliminary studies have started exploring whether the establishment of a high number of causal connections and the presence of discourse markers between statements promote spoken discourse comprehension, and some investigations have started testing whether issuing a warning that incorrect ideas will be introduced in a conversation facilitates the detection of the inconsistency between these ideas and participants' prior knowledge. The presentation of these studies will allow us to examine whether the establishment of discourse connections and the detection of inconsistencies facilitate both the comprehension of written and spoken discourse, and to consider whether the procedures that have been applied to promote the comprehension of written discourse can be applied to that of spoken discourse in educational settings.

### Facilitation of the Comprehension of Written Discourse

Two of the ways in which the comprehension of written discourse can be promoted is by implementing text revision procedures and by presenting students with refutation texts (Linderholm et al., 2000).

Text revision procedures involve the introduction of changes in original texts in order to facilitate the establishment of connections among statements (Vidal-Abarca & Gilabert, 2003). They can be systematic or non-systematic. This paper will focus on systematic procedures, given that they provide a set of specific ideas on how to revise the text to promote comprehension (Linderholm et al., 2000). They include: the *augmenting argument overlap procedure*, the *causal-temporal method* and the *increasing coherence relations procedure* (Vidal-Abarca & Gilabert, 2003. For non-systematic text revision procedures, see Britton, Van Dusen, Gulgoz, & Glynn, 1989; Duffy et al., 1989).

Refutation texts are designed by modifying original expository texts, and making explicit the incorrect ideas that readers tend to have about the topic that they present, refuting them and presenting the correct idea (Hynd, 2001; Limon, 2003). This modification is expected to promote the co-activation of the correct and incorrect ideas, and to facilitate the detection of the inconsistency between them and the revision of the incorrect idea (Kendeou & van den Broek, 2008).

### Facilitative Role of the Establishment of Discourse Connections in Written Discourse Comprehension: Effect of the Implementation of Text Revision Procedures

### Augmenting Argument Overlap Procedure

This procedure is based on Kintsch and van Dijk's Construction-Integration model (1978). According to its proposals, reading proceeds in cycles. In each of them, the reader can only process the main ideas of one statement. In consequence, when two adjacent statements share words, the reader can easily establish a referential connection between them. When they do not share words or when referents are ambiguous, the reader needs to generate an inference in order to connect them. If he or she is not able to do so, the sentences will not be integrated in the resulting mental representation.

In order to facilitate comprehension, the argument overlap procedure involves identifying the cases in which two adjacent statements do not share words in a particular text and: 1) re-writing the second statement, in order to repeat a word from the previous statement, 2) re-ordering the second statement, in order for the words that have been referred to in the previous statement to appear first, followed by the new information, and 3) making explicit any important implicit reference. These revisions are expected to make explicit the implicit connections between statements, and to eliminate the need to generate inferences. For example (Vidal-Abarca et al., 2000):

*Revised text (changes introduced in the original text underlined):*

*During the 19th century, Russia had managed to stay on the sidelines of the political, economic and scientific revolutions which had socially transformed the rest of Europe. Political power (1) in Russia was controlled by the Czars who reacted with a firm hand against any attempt at reform (2) by some social groups. At the outset of the 20th century, the nobility and the clergy were still the dominant social groups. The middle class was practically non-existent and the minority (3) social group of the proletariat pushed for revolution.*

In this example, the inclusion of (1) and (3) promote the establishment of the connection between the adjacent statements by repeating a previous word, and (2) does so by making explicit an implicit reference.

Britton and Gulgoz (1991) applied these procedures to a History text, and observed that the presentation of the revised version facilitated American college students' immediate and delayed recall in comparison to the presentation of the original text. Vidal-Abarca et al. (2000) found that the presentation of the revised version of a second History text facilitated immediate and delayed recall by Spanish high-school students, but did not facilitate the answering of inference questions (which require for the comprehender to establish connections between adjacent and distant statements). In other words, this procedure contributes to superficial comprehension, but does not promote the integration of the text as a whole.

### Causal-Temporal Method

This procedure is based on models of causality processing during narrative text comprehension (Graesser, Singer & Trabasso, 1994; Trabasso & van den

Broek, 1985; van den Broek, 1990, 1994, 2010). According to their proposals, the establishment of causal connections is central for comprehension. Consistent with this idea, prior studies have found that the establishment of a high number of causal connections among statements facilitates recall and question-answering (Espin, Cevasco, van den Broek, Baker, & Gersten, 2007; Radvansky, Tamplin, Armendarez, & Thompson, 2014; Trabasso & Sperry, 1985).

During text comprehension, the reader needs to establish causal connections between adjacent and distant explicit statements, and between explicit statements and his or her prior knowledge (van den Broek, 1990, 1994, 2010; Trabasso & Sperry, 1985; Zwaan & Rapp, 2006). Establishing connections between adjacent statements is easy, because the causal antecedent is still active in working memory. Establishing connections between distant statements is more difficult, because readers must search through long-term memory for previous statements that provide causal justification (van den Broek, 1994). If there is no prior text that provides this information, comprehenders must search background knowledge to provide an explanation. If they do not possess such knowledge, they will not be able to establish the causal connection (Linderholm et al., 2000).

In order to promote comprehension, the causal temporal method involves identifying the causal connections that exist among the original statements of any History text (given that these texts have similar structure to narratives). This is done by following the criteria proposed by the Causal Network Theory (Trabasso & Sperry, 1985). These criteria include: *temporal priority* (a cause must come before its outcome), *operativity* (a cause must be active or in operation when the outcome occurs), *necessity* (a cause must be necessary for the event to occur, that is, one must be able to state that if the event described in statement A had not happened, then the event described in statement B would not have happened). After these connections have been identified, the reviewer introduces statements that allow for the establishment of new causal connections, and which clarify or elaborate on the ideas necessary to establish connections between original statements and between original statements and background knowledge, (Linderholm et al., 2000). For example (Vidal-Abarca et al., 2000):

*Revised text (changes introduced in the original text underlined):*

*(1) Between 1881 and 1914 economic growth took place in Russia thanks to foreign capital loans... (1b) The foreign loans not only did not solve the problems of the population (1c) but forced Russia into ever greater debt with even more countries.*

*(2) The situation of economic dependence was strongly denounced by Lenin.*

In this example, the inclusion of statements (1b) and (1c) facilitate the establishment of the connection between (1) and (2), by making background knowledge explicit.

Vidal-abarca et al. (2000) presented the revised version of a History text to Spanish high-school students, and observed that they recalled a higher number of statements and were more able to answer to inference questions than students

who had read the original text. Similar results were found by Linderholm et al. (2000) with American college students. These findings suggest that the application of this method promotes the generation of inferences, and leads to deep comprehension of the text.

### Increasing Density of Coherence Relations Procedure

This revision procedure is based on the *Expository Text Analysis Tool* (Vidal-Abarca, Reyes, Gilabert, Calpe, Soria & Graesser, 2002). This computational tool allows for the analysis and promotion of a number of discourse connections among the ideas of any expository text. These connections include: *initiate*, *outcome*, *reason*, *cause* (these first four describe causal connections), *description*, and *example of*. It can be proposed that a statement *initiates* a goal described in another one if it specifies the conditions or circumstances that elicit it. A statement represents an *outcome* if it specifies if a goal described in another one is reached. A *reason* connection exists between two statements, if a subordinate goal described in one of them needs to be achieved in order to achieve the superordinate goal described in the other one. The *causal* connection has two subtypes: *direct cause* and *enables*. In the case of a *direct cause*, one statement is both a necessary and sufficient condition for another one. In the case of *enables*, one statement is necessary, but not sufficient, for another statement. One statement *describes* another when the first one presents one or more arguments belonging to the second one. One statement is an *example of* another one if the first specifies a more general or abstract idea formulated in the second one.

In order to promote comprehension through this method, the reviewer first needs to identify the discourse connections that exist in the original text. This information is then entered into ETAT (for a detailed description see Vidal-Abarca et al., 2002), which provides a graph of discourse connections. This graph includes nodes (which represent the statements) and arrows (which represent the connections), and allows the reviewer to observe the connections that exist among the original statements, and whether there are statements that have no connections or are connected but very distant in the text. Once this information has been obtained, the reviewer can add new statements that increase the average number of connections, and allow for the integration of isolated and distant statements. For example (Barreyro, Molinari-Marotto, Bechis & Cevasco, 2012):

*Revised text (changes introduced in the original text underlined>):*

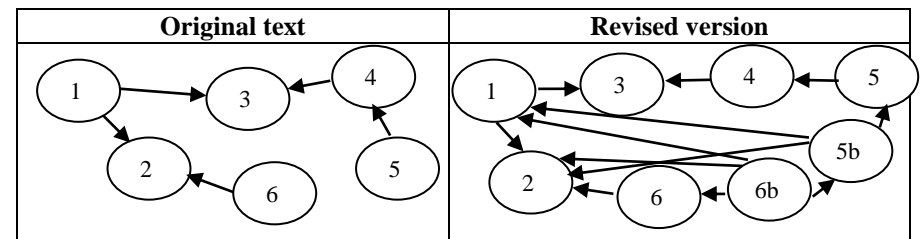
1) When flowering plants appeared on Earth, 130 million years ago, they diversified quickly. 2) Nowadays, they are 20 times more numerous than ferns and trees. 3) Botanists call these plants angiosperms. 4) Unlike conifers, which produce their seeds in open cones, 5) angiosperms enclose theirs in fruits. 5b) What allowed them to dominate the Earth so quickly 6) was their interaction with insects, a process called coevolution, 6b) which allowed for the number of angiosperms to increase dramatically.

*was their interaction with insects, a process called coevolution, 6b) which allowed for the number of angiosperms to increase dramatically.*

Table 1 shows the discourse connections for this text in each version. As can be seen, the inclusion of (5b) allows for the establishment of four new connections (with 1, 2, 5 and 6b), and the inclusion of (6b) allows for the establishment of four new discourse connections (with 1, 2, 5 and 6). Thus, the introduction of these statements contributes to making the text more coherent.

Vidal-Abarca, Gilabert and Abad (2002) revised a Biology text following this procedure, and observed that Spanish high-school students that read the principled version answered more inference questions correctly than those that had read the original text. Similar results were found by Barreyro et al. (2012) with Argentine college students who read a second Biology text. These results suggest that this procedure promotes the construction of global discourse coherence, and leads to deep comprehension of the text.

Table 1. *Graph of discourse connections among statements in Barreyro et al. (2012) according to text version.*



### Contribution of the Detection of Inconsistencies between Comprehenders' Prior Knowledge and New Information in Written Discourse Comprehension: Effect of the Processing of Refutation Texts

When students' prior ideas are inconsistent with those introduced by the text, comprehension becomes more difficult (Kendeou & van den Broek, 2005). In order to promote the detection of the inconsistency between these prior and new ideas, students can be presented with *refutation texts*. These texts are designed by modifying original texts, and making explicit the prior incorrect ideas that readers tend to have about the topic that they introduce, refuting them and presenting the correct idea. It has been proposed that the co-activation of the incorrect and correct ideas promotes the detection of the inconsistency between them, because it induces deep engagement and critical thinking as the result of the cognitive conflict between the ideas (Kendeou & van den Broek, 2007). For example (McCloskey, 1982):

*Newtonian mechanics explains many phenomena related to your everyday life. Imagine the following situation. A person is holding a stone at shoulder*

*height while walking forward at a brisk pace. What will happen when the person drops the stone? (1) Many people answer that the stone will fall straight down, striking the ground directly under the point where it was dropped. (2) A few people are even convinced that the falling stone will land behind the point of its release. (3) In reality, the stone will move forward as it falls, landing a few feet ahead of the release point. Newtonian mechanics explains this phenomenon: When a stone is dropped, it continues to move forward at the same speed as the walking person, because no force is acting to change its horizontal velocity.*

In this example, the text acknowledges two common incorrect ideas: (1) and (2), and then introduces the correct idea (3), in order to promote their coactivation (van den Broek & Kendeou, 2008).

Diakidoy, Kendeou and Ioannides (2003) presented a refutation text on Energy to a group of Greek elementary students, and observed that they provided more correct answers to immediate and delayed questions in comparison to students that had read the original expository text. Mason, Gava and Boldrin (2008) found similar results with elementary students who read a refutation text on Electricity. McCrudden (2012) found that elementary students who were more able to monitor their own comprehension and generate more inferences, were also more able to revise their prior incorrect ideas for the correct ideas presented by a refutation text on Natural Sciences.

The processing of refutation texts has also been found to facilitate the comprehension of adults. Kendeou and van den Broek (2007) observed that American college students who had prior incorrect ideas on Physics made more comments that suggested that they had been able to revise them, when they read a refutation text than when they read the original expository text. Other studies found similar results with adults (Ariasi & Mason, 2011; Broughton, Sinatra & Reynolds, 2010; Kendeou, Muis & Fulton, 2011; Lassonde, Kendeou & O'Brien, 2016).

Taken together, the described studies on the implementation of text revision procedures and the processing of refutation texts provide information about the beneficial effect of facilitating the establishment of discourse connections and promoting the detection of inconsistencies between prior knowledge and new ideas on the comprehension of written texts on a variety of topics (Biology, History, Energy, Electricity), by students of different ages (elementary, high-school and college students) who speak different languages (English, Greek, Spanish). Yet, given that they have only presented them with written discourse materials, they do not allow us to establish if the same variables benefit the comprehension of spoken discourse. Exploring this issue is important, because students are presented with materials in both modalities in learning settings, and there are differences between them that could lead to different effects of the same variables (Cevasco & van den Broek, 2013, 2016; Zwaan & Rapp, 2006). Among them, written discourse allows for the comprehender to process it at their own pace and re-read segments (Chafe, 1994; Ferreira & Anes, 1994),

while spoken discourse needs to be processed at the rate that the speaker produces it and does not allow them to re-process the discourse (Speer & Blodgett, 1996, Stubbs, 1976; 1980). It is possible then that listeners' comprehension is not facilitated by the processing of discourse that involves a high number of connections among statements or by the promotion of the co-activation of incongruent statements, because they may not be able to establish all the connections or detect the inconsistency while processing discourse in real time. Next, we will present preliminary studies that have started exploring this issue.

### **Facilitation of the Comprehension of Spoken Discourse**

Studies on spoken discourse comprehension have usually focused on listeners' ability to predict, detect, and manage disfluencies (Barr & Seyfeddinipurr, 2011; Brennan & Schober, 2001; Fraundorf & Watson, 2011), on listeners' participation role (Schober & Clark, 1989; Muller & Hirst, 2014) and on the processing of prosodic cues (Kraljic & Brennan, 2005; Wagner & Watson, 2010). These investigations have tended to examine the comprehension of single or pairs of statements (Fraundorf & Watson, 2011). Yet, some preliminary studies have started testing whether the establishment of discourse connections and the detection of inconsistencies promote the construction of spoken discourse coherence as a whole. Even when these set of studies have not been aimed explicitly at facilitating comprehension in the same way that studies that have implemented text revision procedures or presented refutation texts have, they provide information on the effect that the variables that have been found to promote the comprehension of written discourse can have on that of spoken discourse.

### **Facilitative Role of the Establishment of Discourse Connections in Spoken Discourse Comprehension: Effect of the Causal Connectivity of the Statements and Discourse Markers Presence**

Studies that provide information about the effect of the establishment of discourse connections on the facilitation of spoken discourse comprehension have tended to focus on whether the establishment of a high number of causal connections and the presence of discourse markers between statements promote the construction of a coherent representation of discourse.

Given that previous studies have already suggested that the establishment of causal connections contributes to written discourse comprehension, Cevasco and van den Broek (2008) aimed to explore whether it also facilitates that of spoken discourse. With this aim, they parsed an excerpt of a radio transmission in English into causes and consequences expressed in the announcers' statements following the Causal Network Theory procedures (Trabasso & Sperry, 1985). This allowed them to establish the *causal connectivity* or total number of causal connections that each statement had. In order to test its effect on recall and question-answering, they asked American college students to either listen to the excerpt of the transmission or to read its transcript. Results indicated that the more causally connected statements were better recalled and more often

included in answers to questions about the materials than the less causally connected statements. Similar results were found by Gaviria and Cevasco (2012) with Colombian high-school and college students.

In turn, the presence of discourse markers (such as *because*, *and*, *but*) has been found to facilitate the formation of an integrated representation of adjacent statements (Halliday & Hasan, 1976; Millis and Just, 1994; Schiffrin, 1987). Discourse markers are words or short phrases that specify the type of connection that exists between two statements (*additive*, *causal*, *adversative*). Previous studies with written discourse suggest that their presence promotes recall (Caron, Micko & Thuring, 1988; Murray, 1995), question-answering (Maury & Teisseranc, 2005; Millis & Just, 1994; van Silfhout, Evers-Vermeul & Sanders, 2015), and topic change identification (Cevasco, Muller & Bermejo, 2015). Even when most studies on discourse markers have focused on written discourse, a smaller number of them have focused on their role in the comprehension of spoken discourse. Flowerdew and Tauroza (1995) found that Chinese-speaking college students wrote better summaries and provided more correct answers to comprehension questions when they were presented with a videotaped Engineering class in English with its original discourse markers (*adversative*, *causal*, *additive*, *temporal*) than without them. Jung (2003) found similar results with Korean college students. Cevasco (2009) found that the presence of adversative discourse markers (*but*) facilitated sentence recognition by American college students who had been presented with excerpts of informal conversations.

### **Contribution of the Detection of Inconsistencies between Prior Knowledge and New Ideas in Spoken Discourse Comprehension: Effect of Promoting the Co-activation of Incongruent Spoken Ideas**

Studies that provide information about the contribution of the detection of inconsistencies between prior knowledge and new spoken ideas have tended to focus on students' detection of incongruences between their prior ideas and those introduced by other speakers in a conversation. Unlike studies on written discourse, these have explored the identification of incorrect ideas that are presented to the student, instead of his or her own prior incorrect ideas. Yet, both types of studies converge in that they have examined the effect that promoting the detection of inconsistencies has on comprehension.

Participants of a conversation can have disparate ideas on the same topic prior to taking part in it. This can happen, for example, if they have different versions of the same event (Diehl & Stroebe, 1991; Hirst & Manier, 1996; Wertsch, 1998). One way to study the effect of the introduction of these incongruent ideas in a conversation is to ask students to listen to different versions of the same materials (such as stories) individually (following Sheriff, 1996). These can differ in a number of statements that provide specific details (critical statements). For example, one of the participants can listen to a version

of a story that says "*the only animals that will survive the demolition will be the squirrels*" while the version that another listens to say "*the only survivors of the demolition will be the waterbugs*" (Muller & Hirst, 2010). After this presentation, participants are asked to recall the story together in a *conversation*. For each participant, ideas that are introduced that are part of alternative versions represent incorrect ideas. After the conversation is over, participants are asked to perform tasks that target at the recognition or recall of the original critical statements. These allow for the examination of whether they were able to detect the inconsistency between their ideas and those of another speaker or ended up integrating incorrect ideas in their discourse representation. For example, if a student that was presented with a version of a story that said that "*the only survivors of the demolition will be the squirrels*" selects in a recognition task or includes in a recall protocol that "*the only survivors of the demolition will be the waterbugs*" (which was introduced in the conversation by another participant), it can be proposed that he or she integrated an incorrect idea into his or her discourse representation.

One way to promote that students detect the inconsistency between their prior ideas and those of a specific speaker, is to issue an explicit warning that incorrect ideas will be introduced by him or her in the conversation (Echterhoff, Hirst, & Hussy, 2005; McCabe & Smith, 2002; Wood & Quinn, 2003). This warning can make explicit that this speaker is not competent or has reasons to lie. For example, it can be proposed that he or she was presented with incorrect information (Muller & Hirst, 2010):

*RESEARCHER: "I made a mistake yesterday, and I gave a wrong tape to a student who will soon join us. So, you have to consider what she/he says very carefully, but please, don't tell her/him anything about this because I want to continue running the experiment anyway"*

It has been proposed that after hearing a warning like this, participants increase their attention to what the untrustworthy speaker says, in order to monitor for the production of incorrect ideas (Greene, Flynn, and Loftus, 1982). This is expected to facilitate the reactivation of the listener's prior ideas on the topic of the conversation and their co-activation with the untrustworthy speaker's statements, promoting the detection of the inconsistency between them. Consistent with this idea, Meade and Roediger (2002) found that after hearing a warning about a particular speaker (a confederate), American college students included a lower number of this speaker's statements in their recall protocols than when they had not received a warning. Similar results were found by Cevasco and Muller (2008) and Muller and Hirst (2010) with Argentine college students.

### **Conclusions**

The purpose of this paper was to present an overview of studies that have examined the facilitative role of the establishment of discourse connections and

the detection of inconsistencies between prior knowledge and new ideas on the comprehension of written and spoken discourse.

The reviewed studies on written discourse suggest that promoting the establishment of referential connections, making it easier for the reader to establish causal connections between adjacent and distant statements that are part of history texts, and increasing the number and different types of discourse connections among the statements (such as causal, example, description) of any expository text promote comprehension. They also suggest that making explicit the incorrect ideas that students tend to have about the topic that a text presents and introducing the correct idea promotes the detection of the inconsistency between them, and the revision of the incorrect idea.

The reviewed studies on spoken discourse suggest that the establishment of discourse connections and the detection of inconsistencies between prior ideas and new incongruent ideas promote comprehension too. Statements that have a high number of causal connections make a greater contribution to comprehension than those that have a low number of them. The presence of discourse markers makes it easier for readers to integrate adjacent statements than their absence. Also, the presentation of a warning that incorrect ideas will be introduced in a conversation, makes students more able to monitor their own comprehension and exclude these ideas from their final discourse representation than the absence of this warning.

These results suggest that there are similar variables that facilitate the comprehension of written and spoken discourse, despite their different characteristics. In consequence, it seems useful to explore whether the procedures and guidelines that have been applied to promote the comprehension of written discourse can be applied to facilitate that of spoken discourse in educational settings. Considering that text revision procedures and preliminary studies on spoken discourse suggest that increasing the number and types of connections among statements facilitate comprehension, it would be interesting to examine what would be the effect of instructors applying their suggestions to facilitate the processing of the spoken discourse that they produce as they teach, according to their goals for the class. If the goal is met with students recalling the information that is presented, the instructor can attempt to produce statements that share words, and make sure that references are explicit. If the instructor's goal is to promote deep comprehension of a History topic, he or she can attempt to elaborate on the ideas necessary to establish causal connections among the events that he or she describes. If the goal of the instructor is to promote deep comprehension of a Biology topic, he or she can attempt to establish causal connections among statements, but also introduce several *descriptions* and *examples*. The inclusion of discourse markers (such as *because*, *then*, *for example*) would contribute to the identification of the types of connections that need to be established among statements. It would also be important, if the instructor believes that students usually have prior incorrect ideas on the topic that he or she is presenting, to make these explicit (in order for those who hold them to identify them), and introduce the correct idea to promote

their co-activation, like the author of a refutation text would. Likewise, if there are specific untrustworthy sources that the instructor is aware of (such as particular internet sites), he or she can promote source monitoring by making explicit that they are untrustworthy and why. Considering the results of prior studies, these guidelines could contribute to the promotion of the comprehension of students of different ages and who speak different languages.

It would also be helpful, given that classes tend to include the presentation of both written (handouts, books, power-point slides) and spoken discourse (instructor's spoken statements, the presentation of audios or videos), to integrate the promotion of the establishment of discourse connections and the co-activation of incongruent ideas presented in both modalities. With this aim, instructors could present revised texts, but produce spoken statements that allow for the establishment of new discourse connections. They could also facilitate comprehension by presenting students with refutation texts, but lead a discussion afterwards in which they reintroduce the incorrect ideas followed by the correct idea, to check if students who had prior incorrect ideas were able to revise them. The promotion of the integration of ideas presented in both modalities would bring more opportunities to facilitate the construction of discourse representation of the contents of the class.

It would also be interesting for future studies to examine the effect of the presentation of discourse in other modalities (such as simultaneous oral-written, double oral or written presentation of statements with a high number of connections), the effect of establishment of other discourse connections (temporal, additive), and the role of other variables such as individual differences (working memory capacity, motivation) in comprehension.

In summary, spoken and written discourse comprehension are essential for academic success. Yet, studies on the promotion of student learning have tended to focus on the comprehension of written discourse. In consequence, we do not know if conclusions that have been reached by these studies can be applied to facilitate the comprehension of spoken discourse. Examining this is important, given that when students comprehend discourse presented in this modality, they need to process it at the rate that is produced, and they are not able to re-process the statements. Results of preliminary studies suggest that the promotion of the establishment of discourse connections and the detection of inconsistencies, which have already been found to facilitate the comprehension of written discourse, can also promote that of spoken. In consequence, it seems important to continue exploring potential similarities and differences in the effect that the same variables have on the comprehension of discourse presented in both modalities, in order to offer a comprehensive approach to the facilitation of student learning.

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