

Bilingual Reading from a Dual Coding Perspective

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For bilingual learners, the goal of becoming effective readers can be one of their greatest and most complex educational challenges. Likewise, this goal represents a challenge for bilingual teachers who are continuously turning to second language reading research to inform their practices. However, while research in second language reading has evolved considerably during the past decades, the truth is that bilingual learners continue to struggle with reading, and bilingual teachers with its teaching.

A partial response to this scenario that illustrates the struggles of teachers and learners may stem from those who argue that there is more to reading comprehension than just the appropriate use of background knowledge or the linguistic processing of the propositional content of a text (Steffensen, Goetz, & Cheng, 1999). In fact, critics of popular theories that attempt to account for effective comprehension (i.e., schema theory) argue that models of textual processing that primarily account for verbal processing, leaving non-linguistic processes poorly addressed, tend to lend themselves to criticism, given that reading research over the past decade has consistently shown that reading comprehension is rich in linguistic and non-linguistic information processing (Sadoski, Paivio, & Goetz, 1991; Steffensen, Goetz, & Cheng, 1999). Instead, they have chosen to endorse Paivio's dual coding theory (DCT) as a model that could be adopted to describe the process of reading comprehension. Additionally, one could argue that, because DCT lends itself to encompassing the non-verbal in cognitive process and has theoretical mechanisms to account for a variety of reading responses to reading, it is also congruent with socio-cultural perspectives on reading which allow for the contextualization of the reading experience in itself. Clearly, all the background knowledge each reader brings into the reading process needs to be accounted for in a theory that attempts to account for reading processes of bilingual learners, and DCT seems to allow for this articulation in its theoretical tenets.

The present study expands previous reading research based on dual coding theory (DCT), conducted with first language readers (e.g., Sadoski, 1983, 1984, 1985; Sadoski, & Quast, 1990; Sadoski, Goetz, & Fritz, 1993; Goetz, Sadoski, Fatemi, & Bush, 1994) and second/foreign language readers (e.g., Ponce & Steffensen, 1996; Steffensen, Goetz, & Cheng, 1999). It is specifically sustained on Paivio and Desrochers' (1980) dual coding theory to describe L2 reading comprehension for the case of the bilingual learner. Paivio and Desrochers' (1980) DCT model constituted an expansion of Paivio's (1971) dual coding theory, which attempted to represent how cognitive processes worked. In his original model, Paivio (1971) argued that cognition basically resulted from the functioning of two independent systems that could work both in an interconnected or independent manner. One of these systems was the verbal system, and the other was the non-verbal system. The verbal system would be in charge of encoding and processing verbal stimuli coming from the environment (i.e., letters, words, sentences). Once within the system, these external stimuli would be encoded into representational units Paivio labeled *logogens*. Conversely, the non-verbal system would be in charge of encoding and processing incoming stimuli in the form of representational units labeled *imagens*. The non-verbal system, for example, would handle stimuli that resulted from imagery processes (e.g., visual, auditory, haptic) as well as affective responses to external input.

Paivio and Desrocher's (1980) dual coding model for the bilingual learner differed from Paivio's original model in that a second verbal system to represent bilingual capabilities was introduced. Thus, the dual coding model for the bilingual learner would be comprised of two verbal systems and one imagery system. As in the original systems, the kinds of processing relations among the systems could be of three kinds: representational, associative, and referential. Representational relations would be those needed to encode external input into meaningful representational units for the system to operate

(i.e., imagens in the imagery system or logogens in the verbal system). Associative relations would correspond to those triggered by the processing functioning within each system. For example, a logogen would activate another logogen within the verbal system, or an imagen would activate another imagen in the imagery system. Finally, referential relationships would represent crossover types of processing activity resulting from the activation of a unit within a system (e.g., the verbal system) as a result of the workings of another unit in another system. In the case of the bilingual mind, this could be as a result of a unit in any of the two verbal systems or a unit in the non-verbal system. Paivio and Desrochers pointed out that second verbal system in the dual coding model for the bilingual learner would provide an alternative processing route for the bilingual person.

In this investigation, I sought to gain a richer understanding of how bilingual readers in transitional bilingual classrooms in the U.S. go about fulfilling reading comprehension tasks. Questions that drove this investigation were: Do bilingual readers experience affect when reading fiction in either their L1 or L2? Does the suggestion of affective responses to reading foster higher levels of affect on the part of bilingual readers while reading fiction? If higher levels of affect result from sensitizing readers to developing affective responses to reading fiction, does it have an effect on comprehension levels? In light of the results of the present study, can we continue to claim that we can extend DCT to account for bilingual reading processes involved in reading comprehension?

1. Method

1.1 Participants

A total of sixty-seven 4th graders, whose native language was Spanish, participated in this study. The students were enrolled in a transitional bilingual education program in a public school district in a suburb of a large city in the U.S. They were randomly assigned to either a control or experimental group. There were 31 participants in the experimental group, and 36 participants in the control group.

1.2 Materials

Based on previous research (e.g., Ponce & Steffensen, 1996; Steffensen, Goetz, & Cheng, 1999), a booklet for participants to provide the data to be collected for the study was developed. This booklet was prepared in both Spanish and in English and presented to students in a manila envelope for them to make a selection (i.e., to work in English or Spanish). This booklet consisted of (a) a non-illustrated text, (b) a page for participants to record their reading time, (c) the same non-illustrated text presented in 12 segments, individually followed by a rating scale where participants were expected to rate the segment according to the levels of affect the segment evoked and enough space to provide open-ended responses in support of their ratings, and (d) a follow-up survey to gather both demographic data and general responses to the activity itself.

The non-illustrated text chosen for this study was *Tippy*. *Tippy* was a story taken from the collection entitled *Chicken soup for the pre-teens*. This story was chosen in consultation with the bilingual director of the participating school district. The story was selected based on the director and researcher's own judgment that it was appropriate to the reading level of students.

In order to obtain the readers' self-assessment of affect levels they experienced during the reading of the story, the original text was segmented according to paragraph units, which were presented on a page followed by a five-point rating scale (1=no emotions, 5=high levels of emotions), and space for students to provide open-ended statements and explain their ratings.

The follow-up survey was prepared to obtain demographic information and further insights into the perceived levels of task complexity according to the participants.

Each task presented in the booklet was preceded by written instructions that were read aloud by the researcher to ensure clarity and understanding in the data collection process on the part of the participants.

1.3 Procedures

The data was collected over the course of two weeks in four separate sessions with the collaboration of the classroom teacher and the district's bilingual specialist. Each session took approximately 90 minutes. The data collection took place during the regular class time of students.

With the exception of the training given to the participants in the experimental group, which consisted of a discussion of emotional responses to a text, the data collection followed the procedures in the order below:

- After a brief introduction by the classroom teacher, I gave a brief personal introduction and proceeded to generally describe the purpose and procedures of the study in both English and Spanish.
- Then, I gave students the opportunity to ask questions for clarification.
- With the help of the classroom teacher or bilingual specialist, I proceeded to distribute the envelopes containing the booklets. Each participant received two manila envelopes. One was labeled Spanish/Espanol; the other was labeled English/Inglés. Once all participants had received the two booklets, they were asked to choose one based on whether or not they wanted to read and complete the various activities in English or Spanish. Students were told to make their decision based on the levels of comfort regarding reading in English or Spanish. Upon making their decision, students were asked to turn in the envelope they did not choose.
- Once all unused booklets were collected, and instruction to begin was given, students began completing the activities presented in the questionnaire. Participants were told to wait for directions at the end of each stage. Directions were always read in both English and Spanish. In between stages, I walked around the room to ensure participants were following directions properly.
- After the administration of the questionnaire, all samples were collected, reviewed, counted, and numbered for computational analyses.

On the day of the data collection, the students in the experimental group were instructed on how to explore their own affective responses to written texts during reading in both English and Spanish. This training consisted of three stages: awareness, practice, and assessment.

During the awareness stage, I brought to students' attention the idea that when we read we usually experience emotions. Then, I engaged students in a discussion of emotions by eliciting examples from the students' prior reading experience. I asked the following questions of students: (1) Have you ever felt emotions when reading a story? (2) Can you recall any story for which you had feelings and give some examples? (3) What feelings did you have? (4) What made you feel that way?

During the practice stage, I informed students that I was going to read two stories-- one story would be in English and the other in Spanish. For each of the two stories, procedures were repeated in the same order. First, I read the story once, and asked students to comprehend the story as the story was being read. Then, I informed students that I would read a story for a second time and stop at the end of each paragraph to discuss what emotions, if any, students had experienced.

During the assessment stage, I gave students the envelopes containing the materials for the data collection.

2. Results

Results showed that students in the experimental group reported significantly higher levels ($p = .05$) of emotional responses ($M = 3.4$, $SD = 1.05$) than those in the control group ($M = 2.53$, $SD = .90$), regardless of their level of linguistic proficiency and of comprehension. This was clearly evident when each of the story segments were analyzed individually (see Table 1).

Table 1

A Comparison of Means for Story Segment Ratings

Story Segment #	Control group (n = 31) (<i>M</i>)	Experimental group (n = 29) (<i>M</i>)
1	2.61	3.61
2	2.33	3.55
3	2.94	3.84
4	2.56	3.26
5	2.53	3.00
6	2.47	3.48
7	2.94	3.52
8	2.28	3.06
9	2.39	3.32
10	3.08	3.47
11	2.75	3.40
12	3.14	3.77

However, while levels of reading comprehension measured by the multiple-choice comprehension test were higher for the students in the experimental group ($M = 46.45$, $SD = 19.20$) than those in the control group ($M = 44.07$, $SD = 13.45$), the difference was not statistically significant.

Following previous research by Sadoski et al., an analysis of the open-ended responses the participants provided following their story ratings yielded the following. Participants in the experimental group provided a total of 266 reports. Of these reports, 199 (75%) corresponded to emotional accounts. Of these emotional accounts, 121 reports (61%) corresponded to a specific type of emotion the participant stated followed by an explanation. For example, a response read (1) "I felt very sad because she was going to tell him [that the dog had died]." Another example read: "I felt sorry because he didn't play with his new dog." Additionally, 78 (39%) reports stated an emotion only. In turn, participants in the control group provided a total of 260 reports. Of these 260 reports, 149 (57%) provided emotional accounts. In turn, of these reports, 95 (64%) reports contained an emotion followed by an explanation, and 54 (36%) reports stated only an emotion. Statements that were not considered statements that provided an emotional account were classified as follows: deviations from the text, character judgment, prediction, expectation, speculation, talking with the character, lessons learned by the reader and character, interpreting characters' emotions, etc.

3. Discussion

First, results suggest that raising readers' awareness in regards to affect significantly enhances levels of non-verbal activity within the non-verbal system on the part of bilingual readings. The type of processing evidenced here seems to be representational and associative in nature.

Second, results show that experiencing affect on the part of readers regardless of levels of conscious awareness is still part of the reading process, which is consistent with previous DCT research in L1 and L2. This is evident in the fact that readers in the control group who received no previous training still reported having experienced levels of affect as they read the story. This would provide support to the claim that a comprehensive reading model ought to account for non-verbal processing as well as DCT seems to do.

Third, these results show that cognitive activity in the non-verbal system and verbal system can be experienced independently, and irrespective of the levels of linguistic proficiency readers may have in their L1 and L2. The participants in this study were all English language learners in a transitional bilingual classroom, so by definition these were learners who had not yet acquired full proficiency in English. As this study showed, levels of comprehension, as measured by the multiple-choice comprehension questionnaire, were low for participants in both the experimental ($M = 46.45$) and control group ($M = 44.07$), which indicates that they are still struggling with reading tasks of this nature, and they are in the process of becoming proficient readers in English. This finding also seems

to provide support for dual coding theory as an approach to understanding the cognitive complexities involved in bilingual reading in the sense that DCT predicts that there can be functioning of one system without crossover activity by default. In this case, results show that non-verbal activity (associative in nature) can be enhanced by mere suggestion or by making individuals aware that this can happen. Yet, these results show that crossover activity, which seems to be still needed for overall successful comprehension, does not occur by default. Because of this, one could possibly predict that this may be what distinguishes poor from effective readers. Stated differently, more or enhanced non-verbal processing does not automatically result in more or enhanced verbal processing, which seems to still be needed to reach effective comprehension on the part of bilingual readers in their first or second language.

Fourth, despite the fact that students seemed to still struggle with a comprehension task that more heavily relied on linguistic or propositional comprehension (i.e., a multiple-choice questionnaire), we must keep in mind that this result is not equal to the concept that readers did not experience richness of textual processing activity. In fact, their open-responses in support of their ratings for each of the story segments revealed that readers did engage in rich non-verbal processing activity associated with story comprehension. Most participants were able to provide accounts of their responses to the story they read, indicating levels of comprehension that were not captured by the multiple-choice test--which is not surprising and serves to illustrate the limitation of tests in general.

In conclusion, dual coding theory (DCT) seems to offer a broader and more comprehensive perspective on discourse processing than those that propositional models offer. It provides a theoretical framework capable of providing an answer to the questions of how to simultaneously deal with (a) non-verbal aspects involved in bilingual comprehension (i.e., affect and imagery), and (b) linguistic and pictorial comprehension during discourse processing as demonstrated in previous related research (e.g., Ehlers-Zavala, 1999). Approached from a dual coding perspective, this study yielded additional evidence to support the argument that reading comprehension in the second language, as in the first language, needs to be explained by means of a model that encompasses both linguistic and non-linguistics aspects of comprehension. It suggested that only when researchers and teachers discover reading comprehension strategies that allow learners to make effective use not only of their linguistic processes prior to, during, and after reading comprehension, but also their non-linguistic process, we shall be in a better position to maximize learning opportunities for all readers in the bilingual classroom.

4. Implications for reading teachers and the teaching of strategic reading

The present study leads us, reading teachers in the bilingual classroom, to more fully understand several points. First, mere awareness of the role of affect is not enough for successful bilingual comprehension. As teachers working towards helping readers perform better in comprehension tasks, we need to go beyond raising students' awareness of the role that affect may play in reading to identifying strategies that may help students increase their ability to utilize non-verbal aspects involved in reading comprehension in support of linguistic aspects of reading comprehension and performance.

Second, sustained reflective practices on the exploration of affect on the part of bilingual readers need to play a key role in the repertoire of reading strategies to be taught and modeled on an ongoing basis. Due to the well-accounted evidence that says that readers of all linguistic and cultural backgrounds as well as of various language proficiency levels their L1 and/or L2, teachers must help students develop the ability to reflect on their affective responses to the text they read as they relate to the propositional content of any given text. That is, teachers must help readers understand the need for seeking accountability of their emotions on the written texts they encounter to engage in meaningful and effective comprehension. This idea is consistent with Rosenblatt's (1995) position on reading, arguing for the need to develop reflective readers, which, from a dual coding perspective on bilingual reading, is likely to enhance referential processing during reading, possibly leading to effective comprehension.

Third, consistent with what we have known regarding reading from previous research, the texts or stories we read are mediated by the emotions we feel which calls for understanding and accepting that various responses to reading materials may be possible. In responding to this scenario, teachers ought

to promote learning opportunities that allow learners of diverse backgrounds discover that their responses to texts are shaped by their past cultural, social, and linguistic experiences, which can lead to a variety of textual interpretations, even within readers of the same cultural and linguistic background.

Fourth, engaging readers in analyzing emotions in post-reading activities may likely result in reading empowerment. Helping readers take control over the emotions they feel, or even helping them understand why they are not experiencing emotions, can be a powerful tool to help them become empowered readers. For those readers, who engage in highly rich emotional experiences that may not be congruent with the propositional content of a given story, this may mean that they may have to learn to control their emotions, so that they [emotions] are less likely to get on the way of successful comprehension. Or as Rosenblatt (1995) stated, readers may need to “learn to think rationally in an emotionally colored world” (p. 217). For readers who may resist or may feel reluctant to engage in affective responses due to the perceived demands of their cultural background (i.e., “boys are not supposed to express emotions overtly”), this may mean that they may need to discover the urgency to seek ways to become more involved with the texts they read, if not through emotional accounts (which would be unfortunate), perhaps through the conscious use of strategies that are text-oriented to compensate for the lack of non-verbal involvement with the text.

Fifth, engaging students in the alignment of their verbal and non-verbal responses to texts to help them discover whether or not there may be positions in conflict is not just desirable but essential to developing effective readers. In other words, teachers ought to help students engage in a system of checks-and-balances between what they read and what they feel. A key question teachers may posit to their students may be: Is there consistency between the emotions you feel and the texts you have read? In helping students see the need for addressing this key question, teachers will be developing empowered readers. That is, readers who are able to account for their responses to the texts they read on the printed page. This teaching strategy may likely engage students in responsible and critical readings of texts, allowing them to experience an aesthetic appreciation for the materials they read, which is certainly the ultimate goal many reading teachers hope their students will reach. Just remember the following: “Managing [one’s own] emotions is the starting point for intelligent behavior” (Rosenblatt, 1995, p. 226).

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