Prediction Of Inferences From Verbonic Narratives In Causal Texts

Jhon Holguin-Alvarez, Fernando Ledesma Pérez, Aquila Montañez Huancaya

Abstract: The research explores the effects of iconic verb narration with structure based on a Red Causal model to provoke causal inferences in text comprehension. The study was carried out with two groups of schoolchildren from Lima (four years of age, $n_1 = 45$; and six years, $n_2 = 60$). A causal network evaluation (EVITRE) with triple follow-up was prepared. The results show significant differences in the experimental group of four-year-old children and more intense effects in six-year-old children. It is suggested to use temporal measures to demonstrate the predictability of the appearance of causal inferences in subsequent studies.

Index Terms: Reading Comprehension; textual coherence; causal inferences; reading; iconic verb narration; mental models; causal network text.

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1. INTRODUCTION

Research in making online inferences (McKoon & Ratcliff in [1], supports the processing of text comprehension through the generation of connective propositions. Its importance lies in the search for textual coherence in the mental representation of the reader at another level of representation, either in local understanding or in global understanding of the text. This perspective allows the pedagogue to make better comprehension processes possible in the students, due to the practicality obtained by initial readers and expert readers in the handling of information. Their comprehension processes generate connections based on the analysis of the reading, which makes them more effective in the generative task of inferences. Inferences are capacities that allow the development of a reliable mental representation of the author's propositional contents through written or oral understanding of the text [1], [2], [3], [4], these inferences are triggered during reading by activating prior knowledge and superior processing capabilities. Studies in local inferences have shown the effectiveness of free (fluid) processing during (online) reading activated by emotional narrative mediation [5], [6], or in causal inferences stimulated by sentence link [7], [8], [9], by executive functions of reading in Spanish, English and Portuguese [10], [11]; and also when inferences are caused by causal relationships and identification of referents: words, phrases and others [7], [2], [4], [12].

Access to the construction of a representative model of the text depends on the readability of the understanding, in which the ideas of the reader and the author of the text interact, in congruence; this process is effective in the face of the reader's cognitive fluidity [13], [14]. Studies related to this type of access to the construction of representational models have been oriented from the implication of connective particles to the use of sentence links in oral and written comprehension [2], [8], [12]. In this process, the temporal fluency of understanding depends on the effectiveness in the relationship of key information [15], [4], this has already been proven through intrusive content used in investigations of different

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kinds [16], {17], [18].

1.1 Local construction of textual meaning

The propositional construction of the text that guides comprehension is endowed by making obligatory inferences for comprehension, and this has been discovered in evidence based on the usefulness of the short or long text in the reading process. Various studies [19] [12] [9], generate some controversy in the evaluation of causal inferences determined by temporal measurements, and their benefits in cognitive effort or in the connectivity of predictive information [16], [20], [21]. This highlights the importance of exploration in understanding the meanings that have a non-mechanical understanding [7], but rather, active, supervised by the reader in the process itself they mimic an autonomous style of supervision or metacognition. Undoubtedly, all this occurs despite the fact that most of them comprise texts made up of two paragraphs in the education system of this country; which is already a problem. Therefore, reading comprehension is devoid of other important capacities to understand, such as relational understanding. Oakhill [22], describe that not all inferences are useful for understanding. This position is supported by studies based on its automation, by the elaboration of functional and automatic knowledge [23], [24], [12]. Another position verified the activation of inferences according to the sentence structures of the text, which starts from the causal identification between propositionally connected events in the story, but without a potential degree of sentence relationship [25], [26], [27], [10], [1]. Zunino & Raiter [9] aimed to compare differences in the cognitive processing of short sentences with the presence and absence of a specific connective particle, and with a causal relationship in 22 Spanish-speaking subjects; without finding significant differences in the inferences evaluated, but in response times. The effect of the use of multimedia that Saux et al. [28], improved the development of online causal inferences in young people who detected inconsistencies in texts accompanied by graphics. Similarly, Ramello et al. [11], evaluated the making of local coherence inferences in the reading of texts of 40 Portuguese-speaking children between 10 and 13 years old in Brazil. The younger subjects responded more quickly to the applied test, they found that the vocabulary and the knowledge of the reader contribute to the successes of the participants. The experiences of authors who worked on local inferences from a cognitive perspective [19], [25], [29], [30]; they involved in their study the Causal Network model, which uses links and the categorization of propositional nodes

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in a text with causality as a means to overcome the slowdown of the comprehensive process.

1.2 Verboiconic understanding for local coherence
Initially, studies on iconic understanding and its effect on inferences for both understanding in schoolchildren reported evidence in which the relationship of events occurred from graphic narrative sequences [31]. The effect of hypermedia in teaching young children to read [32], [33], [34], has elucidated that the iconic verb text generates better recollection of implicit data in the representation of photographs or sketches and other materials. Although it has not been possible to evaluate the certainty of its effects in the verbal or iconic narrative modality, it is essential to provide pedagogical tools to the constructive process of understanding through the use of other combinations of sequential graphic information. The study proposed to determine the effects of verboiconic narrations for inferences according to a Red Causal model in two groups of children in a year of experimentation in the capital of Peru (Lima).

2 METHOD

2.1 Research design
The design is experimental [35], and in turn, design of interrupted series with a control group [36], in order to find results of the development of the inferences in a transectional as well as longitudinal way.

2.2 Subjects of study
45 subjects participated in the first group, who were at least 4 years old before starting the study (M $_{(age)}$ = 4 years, 4 months, G. $_{(male)}$ = 41%; G. $_{(female)}$ = 59 %). The second group was made up of 60 subjects with 6 years of age (M $_{(age)}$ = 6 years, 5 months, G. $_{(male)}$ = 67%; G. $_{(female)}$ = 33%). The samples were selected randomly by stratified sampling of uniform allocation [37], since the information about the participants was null before starting the experiments. This procedure allowed them to be integrated into each experimental and control group at random. The procedure was carried out in six classrooms: three from a private school for Initial Education and three state-run at the Primary level. For experimentation, two experimental groups were organized (G$_1$ = verboiconic narration with a causal link; G$_2$ = verboiconic narration without a causal link) and a control group (G$_c$ = verbal narration without text manipulation). The following were considered as control variables: a) Students with regular attendance at the school; b) Students without attending workshops or reinforcement circles during the school year; b) Students with effective visual discrimination and hearing problems; and c) Students without emotional, affective and family problems.

2.3 Materials and procedure
For the measurement of inferences, the test: Evaluation of inferences by causal network triads (EVITRE) was used. This is a quantitative evaluation, collective application, of dichotomous structure; with resolution time of 60 minutes. It was elaborated under the theoretical Red Causal model of experimentation carried out by Molinari & Barreyro (2013). The stories were adapted by categorizing clauses to spark inferences in the readers. The test consisted of six evaluation chapters.

TABLE 1
RELIABILITY OF THE EVITRE TEST

Evaluation rounds (test measurement)	Group 1 (4 years)		Group 2 (6 years)	
	Pre-test (Chapter I)	Pos-test (chapter VI)	Pre-test (Chapter I)	Pos-test (chapter VI)
α (Alfa)	.89	.78	.76	.82
Correlations 1st experimentation (chapter II)	.779**		.827**	
2nd experimentation (chapter III)	.898**		.67*	
3rd experimentation (chapter IV)		.892*		.812**
4th experimentation (chapter V)		.678*		.781**

Note: *p <.005; **p <.001. For the reliability of the pre-test and post-test measurements, the Cronbach Alpha reliability index was evaluated.

The test was applied in both experimental groups: children of four and six years (pretest application = chapter I; experimental application = chapter II, III, IV and V, posttest application = chapter VI) – (Table 1). To calculate the reliability of instruments, the correlation of the evaluation moments, which were called evaluative rounds, and the pre and posttest scores for each group of experiment were analyzed (Table 1). This in order to calculate the coefficients to a test-retest method for the reliability of the instrument. Experts also proceeded to posteori, which consisted of two expert judges in communication teaching in Education, and in communicational linguistics in University Education evaluating each chapter so that the structure of the texts and the questions to be applied are appropriate for the linguistic profile of children. This evaluation of a first chapter allowed two expert judges to review the second one equally; and after the revised observations, a third evaluator also provided a new rating successively. More than 85% of the average validity was obtained.

TABLE 2
EXAMPLE OF EXCERPT FROM THE TEXT "THE LABRADOR AND THE EAGLE" (ADAPTED), BASED ON THE CAUSAL NETWORK MODEL

| Clauses (narrative sequences)	Experimental groups		Questions inserted
	1 Verboiconity methodology with a causal link	2 Verboiconity methodology without causal link	
1.A farmer who had caught an eagle in a trap, 2. He was [surprised] by her beauty. 3.…. and released her.	Projection of images by sequences	Verbal narration, without adaptation of the connective particle.	Why did the farmer release the eagle?
4. The next day the eagle saw the farmer 5. sitting on an old wall 6. that she was about to collapse	Verbal narration	Verbal narration with omission of connective particle: "The next day ... what ..."	Why would the farmer have seen the eagle?

on him.				
7. The eagle wanted to [help] the farmer 8. Quickly flew towards him 9. and snatched the hat from his claws	Image projection		Verbal narration with omission of connective particle: "and"	Why did the eagle remove the hat from the farmer?

Note: The questions were adapted according to the age of the participants in the experiment. Similarly, a more conversational pedagogical procedure was carried out with subjects less than five years of age, and thus collects the responses of the boys and girls with the best fit to the text. The density and connective characteristics of the text were also taken into account for the viability of this process. The categorization of clauses is an adaptation of the proposal "Implementation of the Causal Network Model in a narrative text in Spanish" by Juan Barreyro & Carlos Molinari (2013), Journal of Psychology, 17 (9), 19-32. The text was manipulated according to a pedagogical protocol for the proposal of verboiconicity, it was adapted to suggestions of studies of causal inferences of manipulation of local coherence in the understanding of narratives [16], [26], [21], [24] (table 2). This protocol consisted of accompanying the oral narration with images interspersed by sequence (with a causal connection) (First experimental group: G_1). In the second group, a text without causal connection was used, which was narrated to the participants; In this text the following were omitted: connecting particles, connecting sentences and referents between paragraphs (G_2). The sequences of the evaluative sessions were carried out in activities of 45 to 60 minutes (The experimental teacher applied the methodology indicated in each group. The questions were asked for each sequence accompanied by a pause after narrating each paragraph or presenting each iconographic sequence (Table 2). Each start of activity was carried out with a brief initial motivation plan. This served to meet the subjects with deficiencies with certain problems of oral comprehension. At the end of the evaluative triad by activity, the questions were reviewed with a second reading and thus discard unexpected errors in the process.

3 RESULTS

3.1 Four-year-old subgroup
The pre-test measurement described that the successes between groups were only greater in 45% of subjects in the experimental group, although they did not present differences (F = .002; p> .001) (Figure 1). In the first evaluative round, the comparative indices presented better hits in experimental group 1 (Gexp1: verboiconic narration with a causal link), with more than 50% hits on the questions asked; this difference was not significant either (F = .349; p> .001).
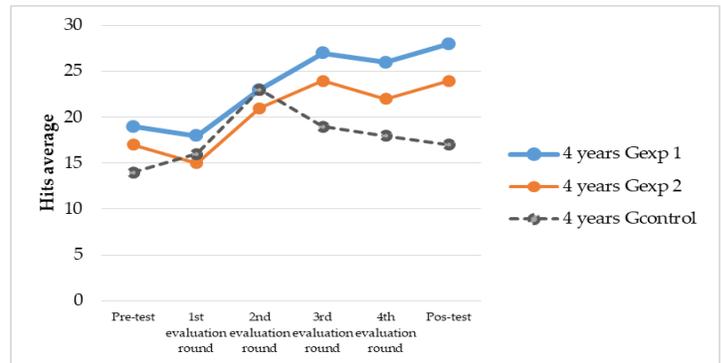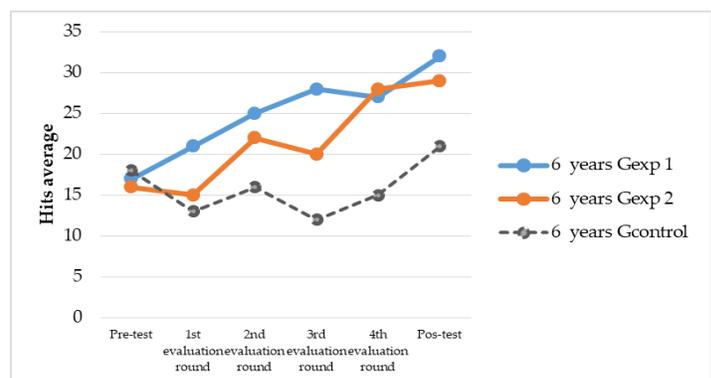

Fig. 1. Average of correct answers in pre-posttest measurements and evaluative rounds in experimental and control subgroup in five-year-old subjects (GExp1 = Experimental group 1, GExp 2 = Experimental group 2; and Gcontrol = Control group).

In the second evaluative round, there were also no significant differences (F =, 231; p> .001), the scores remained identical between group 1 (Gexp 1) and the control group (Gc). In the third and fourth evaluative rounds, the score for experimental group 1 was higher (27 and 26 points respectively). The lowest score was presented in the control group with a difference greater than five points (F$_{(third round)}$ = .321 / F$_{(fourth round)}$ =, 301; p <.001). The post hoc HSD Tukey test confirmed that the third round of verboiconic narration (M = 27.23) had a better effect than the fourth round of narration without a causal link (M = 24.45; p <.005). Finally, in the post-test measurement an Anova was calculated from which the difference between the three groups was obtained, which indicated greater effectiveness of the verboiconic narration as opposed to only oral narration compared to the control group (F =, 331; p <. 001). This was also verified by the Kruskall-Wallis h index of 27.5 for experimental group 1, 23.5 for experimental group 2, and 17.1 for the control group (p <.005).

3.2 Six-year-old subgroup
According to figure 2, in the pretest measurement comparison, the scores were greater than 50% of correct answers in the experimental instrument 1 compared to the other groups, however, this comparison did not report statistical significance (F = 0.078; p > .001). This result was identical in the Kruskall Wallis test (p > .005).

Fig. 2. Average of correct answers in pre-posttest measurements and evaluative rounds in experimental and control subgroup in six-year-old subjects (GExp1 = Experimental group 1, GExp 2 = Experimental group 2; and Gcontrol = Control group).

In the first evaluative round, the score was significantly higher for experimental group 1 (narration with a causal link) than group 2 (narration without a link) and that the control group (only oral narration) (F =, 282; p <.001). In the second evaluative round, equality between groups was observed (F =, 231; p > .001). The HSD Tukey test showed similar equality (HSD = 24.5; p > .001), however, both presented higher scores than the control group. In the third evaluative round, the differences were significant for experimental group 1 (F = .308; p <.001). In the fourth round, change prevailed in the verboiconic narration group without a causal link (Gexp2); and greater than the second group (F =, 275; p <.001). The posttest comparison indicated a greater difference for the experimental group of verboiconic narration (G1 = 32 hits) compared to the experimental group of verboiconic without causal link (G2 = 29 hits); and higher score in the control group (Gc = 21 points) (F =, 312; p <.001). This was also corroborated by Tukey's HSD (Gexp 1 (M) = 31; p <.005).

4   DISCUSSION

The study proposed to establish differences in inferences of local type during the understanding of two groups of students, grouped by the age of four and six years. The results showed that the four-year-old subjects as well as the six-year-old subjects obtained statistically identical scores between the groups in the pretest measurement. This allows us to mention that the experiments started from stable situations before starting with the three types of narrations. The first findings in the group of four-year-old boys and girls again put into question the experiences in textual causality [19], [7], [20], [21], [12], [9]; since the improvement obtained reflected a greater number of hits in the inferences from texts with segmentations with and without causality, which provided fluidity in the responses of the subjects. Despite obtaining changes from the second evaluation round; this evidence lays the foundation that development played a large part in the change in cognitive reading power. Segmentations or categorizations strengthened inferences under a reading model that indicated narrative causality with long texts. However, this possibility of responding better to short texts was also implied, since in the texts, the adaptation of the paragraphs was carefully taken, specifically following the model of Zunino & Raiter [9]. For this reason, the possibility of making inferences with connective particles and causality in short texts would remain valid if it is discounted that, the analysis of the readers was also local due to particular segments of the text. This experience shows that the sequential pedagogy of comprehension shapes short or segmented reading strategies to achieve more fluent local inferences. In another context, Cain et al. [25] distinguished that text can be treated by young readers more effectively when there are well-established basic tools; which continues to agree with these evidences in inferential cognitive development [16], [29], [30]. In the case of the experiment with four-year-old subjects, the causal link verboiconicity was more significant from the third evaluative round. This may resemble other results, the evidence of which was supported by the use of narrative text with images to improve the constructive conversion processes of the propositional meaning of the text [33], [34]. The experiment has made these sequences more viable and faster in the reader's mind; and thus they can be more meaningful when the training with visual projections was more adjusted to the pedagogical environment in the learning sessions in the communication area. It should be noted that in oral narration it was not considered as a central training of stimuli, since it was only a means of ensuring that readers who did not read in written form could use their oral capacity to understand texts. Finally, the oral narration was adjusted to the three groups as a methodological criterion in order to condition the experiment for all the subjects in this group. Regarding the six-year-old experimental subgroup, in the first evaluative round, higher scores were found in the experimental groups compared to the control group, however, the scores between the experimental groups showed favorable differences to the verbo-ionic narration with a causal link. . Although the difference in correct answers was six scores; this implied greater influence of the verboiconics narrations with causal oral narration versus methodology without causality. Regarding the causality of the text, the experimental evidences [27], [10], refer to the processing with better indexes of reading and response time in global understanding when the local is efficient [23], [26], [24], [12]. In the experiment carried out, the results of the second and third evaluative rounds determine that the improvement of inferences was also benefited by more expert comprehensors, who, due to the age development that they demonstrated, used working memory and oral semantic decoding capabilities, which favored general reading comprehension. This can be analyzed in similarity with the proposals of Saux [1] and the results of Ramello et al. [11]. Readers need other skills to draw local inferences: syntactic processing, propositional analysis, and association of sentence meanings. Related to this, the results of Restrepo et al. [38], the usefulness of iconic narrative sequences and oral narration, allow readers to facilitate the construction of implicit meanings. The practical nature of the verboicónica narration with causal nexus allowed in the study subjects with six years of age will speed up the processes that Saux [1] recommends to carry out for the achievement of inferences. This was also corroborated by Abusamra et al. [39]; who considered that the reader needs to discard the unimportant stimuli of the text, and regenerate the propositional structures that he builds during reading. In this regard, the objective of this study was also aimed at finding that this regeneration of structures is carried out all the time during reading. In the case of the modality of discourse, the effect was identical, taking into account that the motivation to premeditate attention was also provided by the use of iconic materials and oral pedagogical verbalization. Subjects in experimental group 1 presented better scores in the posttest result; although in the fourth evaluative round the control group was higher by an average success. Readers of the verboiconic narration groups in both groups (four and six years old), achieved the expected cognitive fluency to achieve local inferences [32], [12], [9], [22], mention that automatic inferences are necessary for memory to be more effective and thus to elaborate global understanding. Finally, it can be added that by means of verboiconicity, pedagogical proposals that are currently carried out without positive effects on reading comprehension in general can be improved. For example, from reading animation, which, through animation by graphics utility, can accompany verbal narrations with young children, and the text written by more avid readers. Another benefit can be focused on improving oral conversations through the involvement of characters dramatized by the students themselves in the hours of reading, and from this, achieve a participatory construction of propositional meanings. As a

limitation, it was found in the study that inferences were not evaluated from a time frame. That is, reading and response times were not evaluated with which to achieve results related to activation of these local inferences. However, the study focused on the measurement of correct answers, it remains as a job to evaluate inferences from that temporal reference and thus, investigate the individual processing of the text; and the particularities from other modalities of experimentation such as lexical decision, emotional convergence; or the analysis of global inferences. It remains relevant for investigations that use the causal network as an evaluative pedagogical approach of automatic and necessary inferences.

5 CONCLUSIONS

The local inferences in the subgroup of subjects with four years of age did not show significant differences when starting the application of experimental stimuli (F = .002; p> .001). This establishes an equitable departure in the measurement of scores between the experimental and control groups. In the first two evaluative rounds there were no significant differences in the same subgroup (F $_{(first round)}$ = .349; p> .001); F $_{(second round)}$ =, 231; p> .001). In evaluative rounds III and IV; Better hits were identified in the local inferences, being favorable to the experimental group of verboiconic narration with a causal link (F $_{(third round)}$ =, 321 / F $_{(fourth round)}$ =, 301; p <.001). The verboiconic narration without a causal link in the Gexp 2 experimental group was also significantly different from the control group. In the post-test measurement, the differences were significant with higher scores for the experimental group of causal verboiconic narrations (M = 27.5; p <.001). In the pretest measurement of the local inferences of six-year-old students, the comparison of correct scores showed no significant differences (F = ,078; p> .001). Likewise, the comparison by Kruskall Wallis confirmed the same similarity between groups (p> .005). In the evaluative round I and II, the significant differences were favorable to the experimental group 1, with verboiconic narration with a causal link, secondly for the experimental group 2, with narration without causality unlike the control group (F $_{(first round)}$ = ,282 / F $_{(second round)}$ = ,231; p <.001). In the third evaluative round of local inferences, the subjects of the experimental group with verboiconic narrations with a causal link presented better results than the group without using the causal link (F = .308; p <.001). In the fourth round, the subjects in the experimental group who were administered verboiconic narratives without a causal link had higher scores than the subjects in the experimental group with a causal link and the control group (F =, 275; p <.001). In the posttest measurement, the differences revealed that the subjects who participated in the experimental group of verboiconic narration with a causal link scored statistically better than those who participated in the experimental group without a causal link, and both results better than the subjects of the control group (F =, 312; p <.001). This result was also corroborated by the Kruskall Wallis test showing a similar difference (p <.005).

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