

Reading Aloud Narrative Material as a Means for the Student's Cognitive Empowerment

Marco Bartolucci¹  and Federico Batini²

ABSTRACT— Listening to stories and brain processing of narrative material activates many areas devoted not only to the linguistic processing. In this sense, it could be hypothesized that if this activity would be integrated within the school curricula, it could bring benefits in terms of understanding the text as well as in basic essential cognitive dimensions. In a series of studies with different age groups, we investigated the effects of an intensive training in narrative listening, through different tools such as the standardized tests of understanding of the text. We also used a neuropsychological battery investigating basic cognitive processes (cognitive assessment system) that are directly related to the ability of text comprehension. Results show a significant improvement in all tests for all age groups in the experimental groups, in comparison with the control groups.

Each man is, basically, a “narrator.” Considered as communicating something (usually to someone) in a temporal order, narration activates processes that are referable to the purely cognitive elaboration of information as well as to the construction of meanings. An essential condition for making a story possible is simply the event, something that happened and is shared by the narrator (Jedlowski, 2010). Sharing, in turn, implies the relational and dialogical nature, which is established between the narrator and the listener, or reader.

The protagonist of the story, whether it coincides or not with the narrator or author in the narrative fiction, introduces himself in a situation of vulnerability. The reader, or listener, can feel empathy, identify with him, or take a “different” point of view, a third point of view with respect to the narration in which he is involved. In the story, one may or may not recognize the own experience of the world. In the first case, the listener manages to frame the story in his beliefs, schemes, and representations; in the second case, the information received can go beyond the threshold of the conventional, be allusive, “question” our experience of the world and the functioning of people, relationships, and events. This attracts us because we perceive an imbalance (Bruner, 1999) that must be somehow fixed (either in the story itself or in the listener/reader). We could say that in a story there is a silent exchange: While the characters “talk” about themselves (e.g., through their actions in the story), the reader or listener can identify with them or meet different points of view and choices, being involved in a different perspective “from the inside.” (Jedlowski, 2013). Man constantly creates and listens to stories: this activity is clearly manifested in the brain, especially in the left hemisphere (Turk et al., 2002). As it has been demonstrated in the exceptional case of split-brains, the left hemisphere—in the absence of perceptual information or in the presence of data provided by the right hemisphere—tries to elaborate a logical thread. Organizing the events in a story allows to give them a meaning. The need to interpret and place in a meaningful framework everything that happens around us leads to build stories. Over time, stories concerning us produce an autobiographical memory and help us to build our self (Longo, Azañón, & Haggard, 2010). All this happens through brain modifications and activations that the exposure to the narration elicits.

¹Università Degli Studi di Perugia

²University of Perugia

Address correspondence to Marco Bartolucci, Università Degli Studi di Perugia, FISSUF Department Piazza Ermini 1, 06123 Perugia, Italy; e-mail: marco.bartolucci@unipg.it

Activation of Brain Connections

Reading stories brings about lasting changes in the activation of brain connections detected through functional magnetic resonance imaging. Immediately after reading a novel, short-term changes were observed in both the left angular and supramarginal gyrus and the right posterior temporal gyrus, whereas changes in activation observed in the bilateral somatosensory cortex were maintained in the following days (Berns, Blaine, Prietula, & Pye, 2018). Connections of the left angular and supramarginal gyrus and the right temporal gyrus were previously managing functions such as perspective taking (which indicates the ability to understand thoughts, feelings, and perspectives) and therefore they are useful for understanding the story. The changes observed in the bilateral somatosensory cortex (found to be more persistent) concern an area with a specific function: the "embodied semantics," which is a psychophysiological phenomenon that consists in a hypothesized interaction, at the brain level, between operations of decoding of verbal language and activation of cortical systems of motor regulation (Berns et al., 2013).

Reading is therefore much more than just a linguistic elaboration of meaningful words and phrases.

The Process of Understanding

Reading stories triggers many different cognitive mechanisms (Mar, 2004) and readers represent what the text describes through mental images that support their understanding. Understanding is also supported by motor activations that produce a vicarious experience, compared to the experience of the protagonist. In fact, the motor activations seem to be consistent with the actions that the protagonist is performing.

The representations produced by the reader/listener during the reading experience are also known as "situational models" and incorporate information about space, time, causal relationships, and characters (Zwaan & Radvansky, 1998). The brain regions involved in understanding the text are necessarily various and not just strictly linguistic: probably, any network that supports language, memory, and even perception plays a role in this process (Mar, 2004). In general, reading activates, at the cerebral level, a vast network of areas (Batini & Bartolucci, 2014), operating at different cognitive levels, constituting a real "gym" for cognitive functions as well as for mnemonic and emotional functions (Billington, Carroll, Davis, Healey, & Kinderman, 2012), for executive functions and for the speed of information elaboration (Uchida & Kawashima, 2008).

Decrease in the Number of Readers: Facilitating and Hindering Conditions

Although reading is therefore a practice rich in benefits for both adults and children, an ISTAT survey published on 13

January 2016 estimates that in Italy in 2015 only "42% of people aged 6 years and over (about 24 million) had read at least one book in the 12 months preceding the survey for reasons other than strictly school or professional" (ISTAT, 2016). The only age group in which the number of readers exceeds 50% is the one between the ages of 11 and 19, whereas geographically the most critical area is the South: 28.8% of readers. It should also be distinguished between "strong" and "weak" readers: The former read at least one book per month, on average, and the latter read at least one book per year. In 2015, 13.7% of the readership was "strong" compared to 45.5% of "weak" readers.

In a new survey published on 27 December 2017 and concerning the 2016, ISTAT confirms the trend of the previous year. "Readers are decreasing, from 42.0% (population aged 6 and over in 2015) to 40.5% in 2016" (ISTAT, 2017). There is still a great imbalance between North and South Italy, because of the influence of several cultural and socioeconomic factors.

The decrease in the number of readers is mainly due to the decrease in the number of weak readers, who more easily become "nonreaders" (it is not difficult to go from one or two books read in 1 year to zero). Barriers seem to be lack of time and examples as well as a limited access to children's books. The first cause leads some adults to progressively move away from reading; The second, which may or may not be a direct consequence of lack of time, is related to the limited access to places where reading of children's books is promoted.

Reading habits learned at this age have a direct correspondence to adult reading habits: Most "strong readers" have had parents who spent time to reading aloud with them in the first 5 years of life (Duursma, Augustyn, & Zuckerman, 2008). The saddest and most worrying fact is that sometimes school imposes reading as a compulsory task, so that children lose interest. Another aspect that seems to influence the number of read books is the socioeconomic status of the family.

In families with parents with professional roles or high socioeconomic status, it seems that 3-year-old children have a cumulative vocabulary of about 1,100 words. Those from families in the working class have a vocabulary of about 750 words and the ones from families with low socioeconomic status have an observed cumulative vocabulary of 500 words. In "professional families," parents invest more in their children's language and use a wider vocabulary with them, made of more adjectives and verbs. Parents of families with low socioeconomic status spend, on average, less time with their children, use more imperatives with them and impose more prohibitions. It is also deemed that children growing up in families with low socioeconomic status have less access to paper books and to moments of reading aloud or shared reading.

Reading, School, and Educational Success

The different investment has obvious repercussions on children's literacy and future reading skills (Duursma et al., 2008; McCormick, 1977; Wolf, Barzillai, & Dunne, 2009).

This risk factor has been reconsidered by several authors who, shifting the focus from income to the relationship between the types of workers and their children, use it to state the importance of the way in which preschool reading is endorsed (Duursma et al., 2008). Systematic exposure to reading aloud can reinforce the development of many of the skills required in early school years. Many studies in literature remarked an increase in both the "active" (the terms used in everyday language) and the "passive" vocabulary (all terms whose meaning we know and that we are able to correctly use in a sentence) (Duursma et al., 2008).

The ability to understand the text is an influential factor in the development of children and their learning and study strategies. Study methods become a very important means of achieving significant school results, also because the commitment required in school career becomes increasingly greater. However, there are two variables to pay particular attention to: meta-cognition and reading comprehension skills. When reading a text, in addition to the task of decoding the written language, the student must also attribute meaning to it, by selecting the most relevant information, placing it in an overall "context" of meaning as well as giving meaning to each term. Reading promotes and trains the skills through which we understand a text and give it a meaning and also contributes to the development of metacognitive skills.

Cognitive processes that allow the management of incoming information are cognitive processes such as attention, succession, and planning that play a crucial role in this regard and reading is able to foster them (Bartolucci & Batini, 2019).

A public and compulsory education system cannot only be addressed to those who arrive at the school experience with rich preliminary vocabulary and reading skills. It should provide educational actions allowing everyone—regardless of origin—to take advantage of the learning experience. In this sense, reading aloud proves to be a really suitable tool to promote basic skills and the underlying cognitive functions.

With a view to promoting good teaching practices, in this contribution we show the results of an experiment carried out in different primary schools. We have implemented intensive training in reading aloud narrative materials in order to verify the effects of such training on students, in terms of empowerment of both cognitive processes responsible for managing information and those needed for learning at school.

The choice of the natural environment, the class, is not neutral. The aim of the research is in fact to promote the reading aloud practice in the school context and to show the effects, especially when compared with the daily teaching

practices. The conditions and reactions that occur in the natural environment with real classes, indeed, are different from those that could be obtained in the laboratory context where the artificiality of place and situation would not allow any generalization.

METHODS

A total of 165 students from different schools participated in the studies. The groups were created on the basis of both age and the fact that they were in parallel classes, doing the same type of activity during the school year. The selected groups were homogeneous in terms of general cognitive skills (no children reported as disadvantaged), socio-economic background, and no psychological and social problems were highlighted. Training has been realized during 60 reading aloud sessions for the experimental group (lasting from 15 min—especially at the beginning—up to 1 hr each, with daily frequency, 5 days a week, from Monday to Friday). At the beginning, texts were used that were characterized not only by their general brevity, but also by the structure of the period, articulated in short sentences so that the understanding was accessible. Texts with longer semantic units and longer overall duration were progressively used. We proceeded in a similar way with regard to the level of linguistic difficulty, so in the last part of the training we used texts that were not ended in a single day of reading, thus requiring the children to remember the contents of the "previous episode."

Study 1

The study included a total of 42 students (second-year classes) and 38 students (third-year classes). For the second-year classes the experimental group was composed of 22 students (average age 7 year 4 months) and the control group consisted of 20 students (average age 7 years 6 months); in the third-year classes the experimental group was composed of 18 students (average age 8 years 6 months) and the control group consisted of 20 students (average age 8 years 4 months). Before and after the training all subjects were given the INVALSI (INVALSI 2014, INVALSI 2015) test of comprehension of the written text used by the National Institute for the Evaluation of the Education System (INVALSI), a body that is responsible for both detecting the levels of learning in all Italian regions and evaluating the effectiveness of the school curriculum. The analysis of the baselines of the two groups did not reveal statistically significant differences.

Study 2

A total of 29 students took part in Study 2. Fourteen of them were in the experimental group (average age 8 years

7 months) and 15 in the control group (average age 8 years 5 months). Before and after the training, both groups were given the Progress in International Reading Literacy Study (PIRLS) text comprehension tests (PIRLS-ICONA 2006 and IEA-PIRLS 2011): After reading a text, students were required to answer various questions related to it. The questions in the PIRLS tests are based on four information processing processes: focusing and obtaining the information provided explicitly, making simple inferences, interpreting and integrating concepts and information, examining and evaluating content and formal aspects of the text. The analysis of the baselines of the two groups did not reveal statistically significant differences in the starting point of the two groups.

Study 3

A total of 33 students took part in Study 3. Sixteen of them were in the experimental group (average age 6 years 7 months) and 17 in the control group (average age 6 years 5 months). Before and after the training, both groups were given AMOS 8–15 battery tests (De Beni et al., 2014), which assesses the subject's ability to learn the contents of a text and to process the main components. The analysis of the baselines of the two groups did not reveal statistically significant differences in the starting point of the two groups.

Study 4

A total of 67 students participated in the study. The experimental group was composed of 33 students (average age 12 years 5 months), whereas the control group was made up of 34 students (average age 12 years 7 months). The tool used to test the students before and after the training is the cognitive assessment system (Naglieri, Taddei, & Williams, 2013). The cognitive assessment system evaluates cognitive processes in children and adolescents aged between 5 and 17. The tool is based on Luria's PASS theory (1966, 1973), which considers cognitive functioning as based on four essential processes: Planning, Attention, Simultaneity, and Succession (PASS). At the basis of the construction of this tool are studies that propose a multidimensional and dynamic approach to intelligence, based on neuropsychology and cognitive psychology (Das, 2002; Das, Naglieri, & Kirby, 1994; Naglieri & Das, 2005a, 2005b).

The process of planning is implicit in cognitive control, in the use of processes and knowledge, and in the intentionality and self-regulation needed to pursue the desired goal. This cognitive process allows the selection and development of plans and strategies that are necessary to solve tasks and problems. The focus refers to focused and selective cognitive activity as well as to the resistance to distraction. This mental process is involved in the driving response; the basal brain structures allow the body to focus selective attention on

a stimulus over time and to counteract the reduction of attention due to the interference of other stimuli.

Simultaneity and succession are essential to make the information operational. Simultaneity is an essential process for organizing information into groups or a coherent whole. Succession is implicit in the use of stimuli organized in a specific serial order. It is activated whenever information is to be remembered or completed in a specific order. The analysis of the baselines of the two groups did not reveal statistically significant differences in the starting point of the two groups.

RESULTS

Study 1

Figures 1 and 2 shows the results of the tests of the Study 1. The results of the statistical analysis (*t* test for independent samples on the average increments of the two groups) report a greater increase between the first and second surveys as regards the experimental groups ($t = 3.698, p < .001$; $t = 3.533, p < .001$).

Study 2

Figure 3 shows the results of the tests of Study 2. The results of the statistical analysis (*t* test for independent samples on the average increments of the two groups) report a greater increase between the first and second surveys as regards the experimental groups ($t = 3.204, p < .01$).

Study 3

Figure 4 shows the results of Study 3. The results of the statistical analysis (*t* test for independent samples on the average increments of the two groups) report a greater increase between the first and second surveys for the experimental groups in the subtests "open questions" ($t = 6.072, p < .001$) and total scale ($t = 3.815, p < .001$).

Study 4

Figure 5 shows the results of Study 4. The graph shows the averages of the increases (or decreases) of the two groups compared. An analysis of analysis of variance 2×2 (time \times groups) shows a statistically significant difference with regard to the interaction time \times group ($df = 1.65, F = 4.372, p < .05$).

DISCUSSION

In each of the four studies, results show a significant increase in the performance of the subjects of the experimental groups to the administered tests. In Studies 1, 2, and 3 we tried to relate the benefits in terms of understanding the

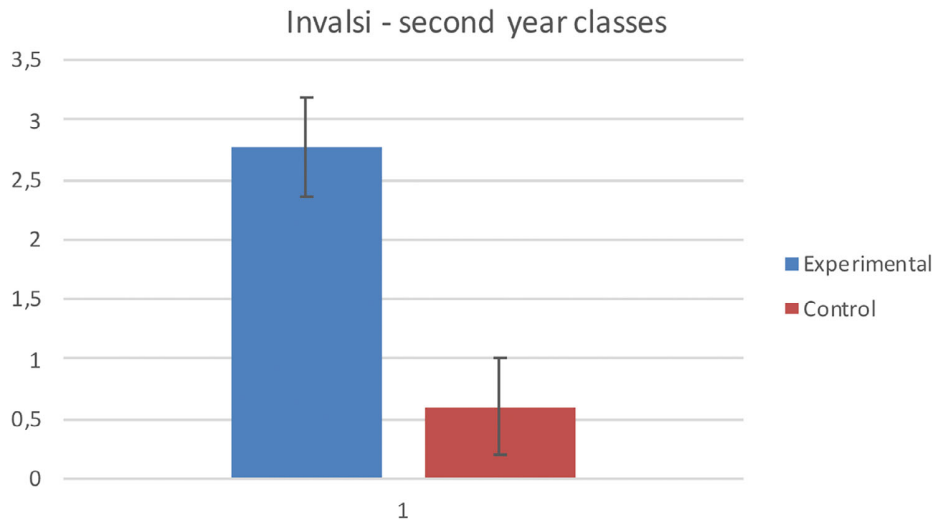


Fig. 1. Effect size (second test session score minus first test session score) of the two groups (second-year classes) of Study 1—INVALSI text comprehension test.

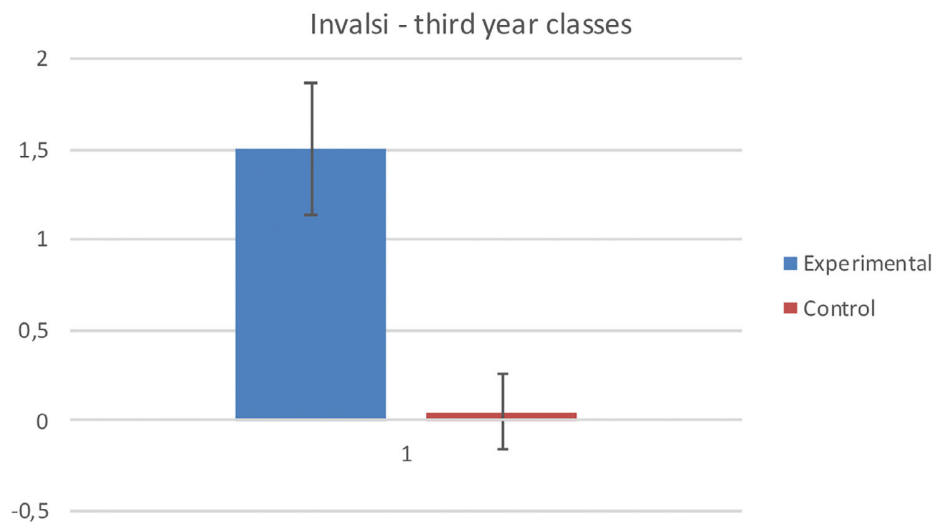


Fig. 2. Effect size (second test session score minus first test session score) of the two groups (third-year classes) of Study 1—INVALSI text comprehension test.

text, which the reading training could elicit, trying to test it with similar tasks, but from different batteries. The results are encouraging, especially because the benefits of the same training—which included preestablished reading materials and therefore materials with peculiar characteristics of style and syntax—have produced an improvement in the tests of comprehension of texts fundamentally different from each other: Benefits are not limited to come out only through texts similar to those used in the training.

As the literature indicates, the reader constantly needs to mentally simulate what he is reading in order to decode and fully understand the meaning of what he is reading

(Gernsbacher, Varner, & Faust, 1990; Graesser, Singer, & Trabasso, 1994; Kintsch & van Dijk, 1978; Trabasso & van den Broek, 1985; van den Broek, 1994; Wagner, Torgesen, & Piasta, 2006; Whitehurst & Lonigan, 1998; Zwaan & Rapp, 2006). The construction of the representation of the text involves a complex set of processes, such as imagining a fact, a movement, an intention, and connecting all these various parts within a specific time.

Some of these processes are simple and fast, others require more effort, especially in terms of concentration, working memory, and high-level cognitive processes such as planning and recognition of the mental states of others

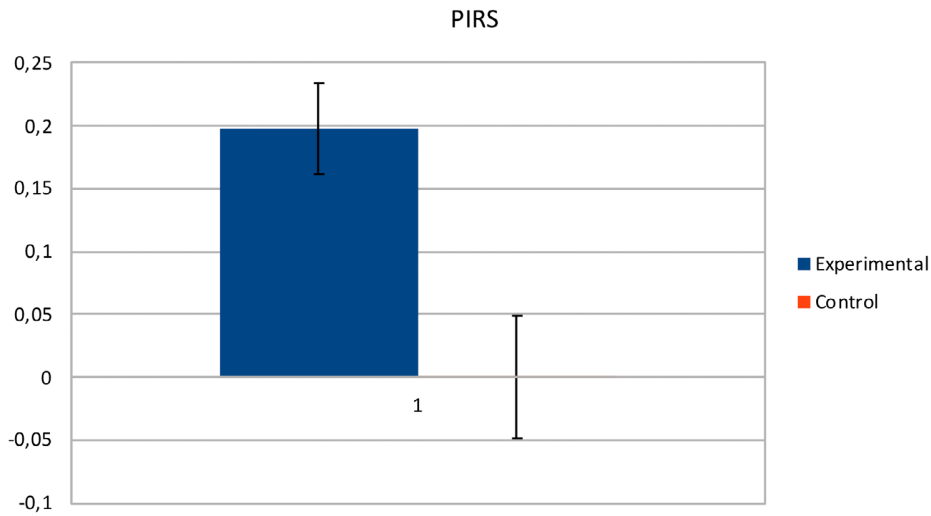


Fig. 3. Effect size (second test session score minus first test session score) of the two groups of Study 2—PIRLS text comprehension test.

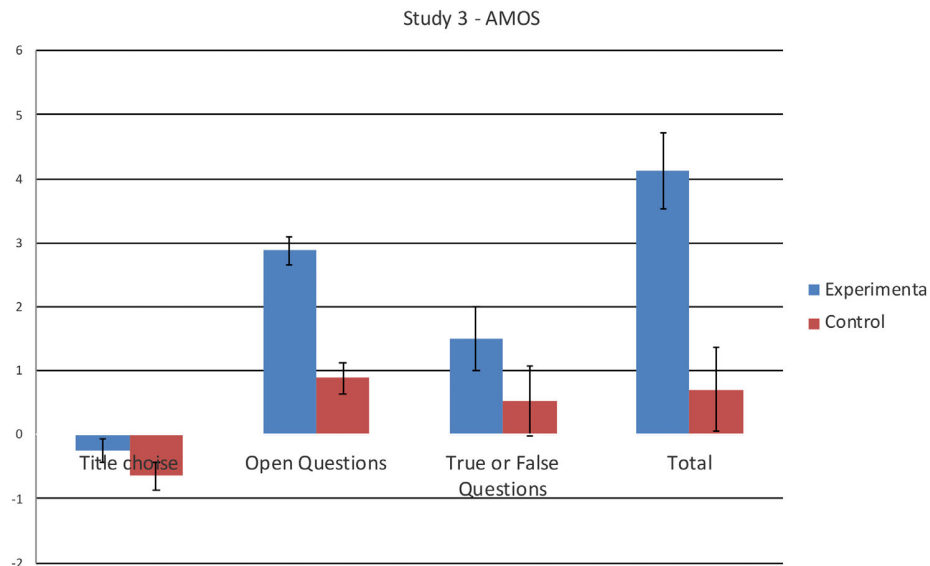


Fig. 4. Effect size (second test session score minus first test session score) of the two groups of Study 3—AMOS text comprehension test.

(van de Velde, 1989; Van den Broek, Risdén, & Husebye-Hartmann, 1995). If, therefore, it seems quite obvious that a training of this type can strengthen first of all the linguistic skills, and secondly those of comprehension of the text—precisely because the accuracy of reading and comprehension of reading seem to be two separate skills influenced by different groups of skills in children (see also Storch & Whitehurst, 2002)—in the Study 4 we tried to investigate the benefits that such training could elicit not only at the level of comprehension of the text, but also of those components which are essential for the comprehension of any text.

Specifically, using the CAS tool, it was possible to detect an increase in performance on the total scale, which consists of all the subscales that specifically investigate the planning processes—which are essential for research and coding of action plans—and the processes of reassessment of these plans following changes or external variables intervening. They also investigate the processes of simultaneity and succession: The first allows the synthesis of separate elements in an interrelated group, whereas the second allows the preservation or understanding of a serial organization of events. Even the attention is investigated, that is the ability to focus on a task: Along with the other three abilities, it is essential

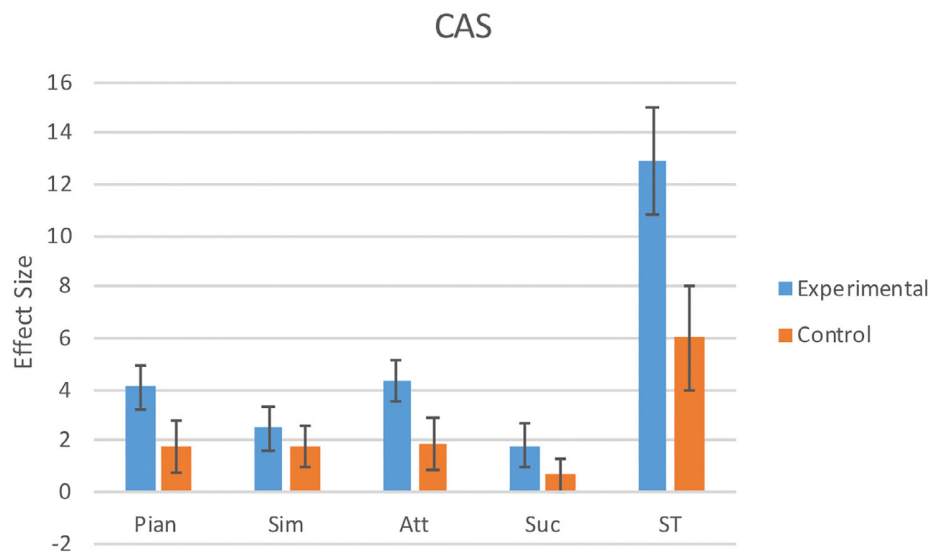


Fig. 5. Effect size (second test session score minus first test session score) of the five dimensions of the CAS test (Plan = planning; Sim = simultaneity; Suc = succession; ST = total scale) for the experimental and control groups.

for the management, manipulation, and understanding of information in general or in a text. These results suggest that reading practice—whether implemented within school curricula and with a high frequency—can bring considerable benefits not only, as already observed in previous studies, on faculties such as emotional recognition and theory of mind in general (Batini, Bartolucci, & Timpone, 2018), but also as regards the comprehension of the text and the basic cognitive components that imply this and other skills, inducing a benefit at the level of cognitive transverse and transferable empowerment. Although the results are consistent between different schools, limitation of the study could arise on a longitudinal perspective: It would be useful, in next studies, to check whether the results are maintained in time, or those reading effects have to be supported by an ongoing training in reading narrative fiction.

REFERENCES

Bartolucci, M., & Batini, F. (2019). The effect of a narrative intervention program for people living with dementia. *Psychology & Neuroscience, 12*(2), 307.

Batini, F., & Bartolucci, M. (2014). Reading, memory and dementia: A pilot study. *Rev Formazione Lavoro, Persona, 4*(10), 117–125.

Batini, F., Bartolucci, M., & Timpone, A. (2018). The effects of Reading Aloud in the Primary School. *Psychology and education, 55*, 111–122.

Berns, G. S., Blaine, K., Prietula, M. J., & Pye, B. E. (2013). Short- and long-term effects of a novel on connectivity in the brain. *Brain Connectivity, 3*(6), 590–600.

Billington, J., Carroll, J., Davis, P., Healey, C., & Kinderman, P. (2012). A literature-based intervention for older people living with dementia. *Perspectives in Public Health, 133*(3), 165–173.

Bruner, J. (1999). Narratives of aging. *Journal of Aging Studies, 13*(1), 7–9.

Das, J. P. (2002). A better look at intelligence. *Current Directions in Psychological Science, 11*(1), 28–33.

Das, J. P., Naglieri, J. A., & Kirby, J. R. (1994) *Assessment of cognitive processes: The PASS theory of intelligence*. Boston, MA: Allyn & Bacon.

De Beni, R., Zamperlin, C., Meneghetti, C., Cornoldi, C., Fabris, M., Tona, G. D. M., & Moè, A. (2014). *Test AMOS-Abilità e motivazione allo studio: prove di valutazione e orientamento per la scuola secondaria di secondo grado e l'università: Nuova edizione*. Edizioni Centro Studi Erickson.

Duursma, E., Augustyn, M., & Zuckerman, B. (2008). Reading aloud to children: The evidence. *Archives of Disease in Childhood, 93*, 554–557.

Gernsbacher, M. A., Varner, K. R., & Faust, M. E. (1990). Investigating differences in general comprehension skill. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 16*(3), 430.

Graesser, A. C., Singer, M., & Trabasso, T. (1994). Constructing inferences during narrative text comprehension. *Psychological Review, 101*(3), 371–395.

ISTAT (2016) *Report La lettura in Italia*. Rome, Italy: Author.

ISTAT (2017) *Report La lettura in Italia*. Rome, Italy: Author.

Jedlowski, P. (2010). Costruzione narrativa della realtà e mondi possibili [Narrative construction of reality and possible worlds]. In *Costruzionismo e scienze sociali*. (pp. 47–56).

Jedlowski, P. (2013). Il piacere del racconto. In *Imparare dalla lettura*. (pp. 19–28). Torino, Italy: Loescher.

Kintsch, W., & Van Dijk, T. A. (1978). Toward a model of text comprehension and production. *Psychological Review, 85*(5), 363–394.

- Longo, M. R., Azañón, E., & Haggard, P. (2010). More than skin deep: Body representation beyond primary somatosensory cortex. *Neuropsychologia*, *48*(3), 655–668.
- Mar, R. A. (2004). The neuropsychology of narrative: Story comprehension, story production and their interrelation. *Neuropsychologia*, *42*(10), 1414–1434.
- McCormick, S. (1977). Should you read aloud to your children? *Language Arts*, *54*(2), 139–163.
- Naglieri, J. A., & Das, J. P. (2005a) *Cognitive assessment system—Adattamento Italiano a cura di S. Taddei*. Firenze, Italy: OS.
- Naglieri, J. A., & Das, J. P. (2005b) *Il DN cognitive assessment system (Adattamento Italiano a Cura di S. Taddei)*. Firenze, Italy: OS.
- Naglieri, J. A., Taddei, S., & Williams, K. M. (2013). Multi group confirmatory factor analysis of US and Italian children's performance on the PASS theory of intelligence as measured by the Cognitive Assessment System. *Psychological assessment*, *25*(1), 157.
- Storch, S. A., & Whitehurst, G. J. (2002). Oral language and code-related precursors to reading: Evidence from a longitudinal structural model. *Developmental Psychology*, *38*(6), 934–947.
- Trabasso, T., & Van Den Broek, P. (1985). Causal thinking and the representation of narrative events. *Journal of Memory and Language*, *24*(5), 612–630.
- Turk, D. J., Heatherton, T. F., Kelley, W. M., Funnell, M. G., Gazzaniga, M. S., & Macrae, C. N. (2002). Mike or me? Self-recognition in a split-brain patient. *Nature Neuroscience*, *5*(9), 841–842.
- Uchida, S., & Kawashima, R. (2008). Reading and solving arithmetic problems improves cognitive functions of normal aged people: A randomized controlled study. *Age*, *30*(1), 21–29.
- Van de Velde, R. G. (1989). Man, verbal text, inferencing, and coherence. In: W. Heydrich, F. Neubauer, J. Petöfi & E. Sözer (Eds.), *Connexity and coherence: Analysis of text and discourse* (pp. 174–214). Berlin: de Gruyter.
- Van den Broek, P. (1994). Comprehension and memory of narrative texts: Inferences and coherence. In M. A. Gernsbacher (Ed.), *Handbook of psycholinguistics* (pp. 539–588). San Diego, CA: Academic Press.
- Van den Broek, P., Risdien, K., & Husebye-Hartmann, E. (1995). *The role of readers' standards for coherence in the generation of inferences during reading*. Part of this research was reported at the Annual Meeting of the American Educational Research Association, 1991. Chicago, IL: Erlbaum.
- Wagner, R. K., Torgesen, J. K., & Piasta, S. B. (2006). Learning to read. In M. J. Traxler & M. A. Gernsbacher (Eds.), *Handbook of psycholinguistics*. (Second ed., pp. 1111–1142). San Diego, CA: Academic Press.
- Whitehurst, G. J., & Lonigan, C. J. (1998). Child development and emergent literacy. *Child Development*, *69*(3), 848–872.
- Wolf, M., Barzillai, M., & Dunne, J. (2009). The importance of deep reading. In M. Scherer (Ed.), *Challenging the whole child: Reflections on best practices in learning, teaching, and leadership*. (Vol. 130, pp. 21). Alexandria, VA: ASCD.
- Zwaan, R. A., & Radvansky, G. A. (1998). Situation models in language comprehension and memory. *Psychological Bulletin*, *123*(2), 162–185.
- Zwaan, R. A., & Rapp, D. N. (2006). Discourse comprehension. In M. J. Traxler & M. A. Gernsbacher (Eds.), *Handbook of psycholinguistics*. (Second ed., pp. 725–764). San Diego, CA: Academic Press.