



## Long term narrative training can enhance cognitive performances in patients living with cognitive decline

Marco Bartolucci & Federico Batini

To cite this article: Marco Bartolucci & Federico Batini (2019) Long term narrative training can enhance cognitive performances in patients living with cognitive decline, Educational Gerontology, 45:7, 469-475, DOI: [10.1080/03601277.2019.1658384](https://doi.org/10.1080/03601277.2019.1658384)

To link to this article: <https://doi.org/10.1080/03601277.2019.1658384>



Published online: 25 Aug 2019.



Submit your article to this journal [↗](#)



Article views: 62



View related articles [↗](#)



View Crossmark data [↗](#)

ARTICLE



# Long term narrative training can enhance cognitive performances in patients living with cognitive decline

Marco Bartolucci  and Federico Batini

Department FISSUF, University of Perugia, Perugia, Italy

## ABSTRACT

Listening to narrative material stimulates and activates multiple areas in the cerebral cortex. It has been shown that such activations produce significant changes in the connectivity of the brain. In literature, findings have shown that in pathological aging (i.e., cognitive decline) patients who underwent a daily narrative training showed some improvements in many psychological and cognitive aspects. Here we aim to investigate the effect of a narrative cognitive training in patients living in a nursing home, by testing them with a neuropsychological battery (RBANS – Randolph, 1998) before and during the training, after 40 days and then after 30 days from the beginning. Results were compared to a control group of patients and showed a significant increase in performances of the experimental group in different cognitive performances. This suggest that these types of trainings could be implemented as an effective non-pharmacological treatment for cognitive decline in the elderly.

## Introduction

By its very nature, the human being is user and creator of stories. First, we listen to them, then we learn to read them and later to narrate stories. Through the stories we know the world around us, we come into contact with the culture of belonging, we build our identity, we give sense to events by placing them in a specific order. If we consider the activity of reading, the first aim that comes to our mind is information acquisition, for sure. Whether one reads a magazine, a newspaper article, a book or anything else, reading is a primary source of knowledge, helping to broaden the personal cultural background. It is also true, however, that the purpose for reading is not singularly direct learning. For many people reading is an activity they do for sheer pleasure and a good way to spend free time. When a person approaches the written text, the effects that this will have on the person are countless and sometimes imperceptible at first sight. What is transmitted to the reader is much more than the simple information conveyed by the text, also because the way in which the text is recognized “depends on both the reader and the text itself. Reading is not to be meant as a direct and automatic interiorization [...] because it is not a one-way process: it is the dynamic interaction *between* text and reader” (D’Alessandro & Domanin, 2005, p. 19). While we read and give a sense of what is written, reading itself models us, our relationship with others and the world. It opens our mind and makes us go toward large and unknown horizons. It makes us travel with the imagination going beyond the real. It makes us know and identify ourselves with many different characters. “Reading is an “antidote” to the narrative manipulation of the others (of the advertising, of the policy), is a defense from the “single thought” (which constitutes the “seed” of the prejudice) and an instrument of the construction and reconstruction of the himself and his own life, it increases the skills

**CONTACT** Marco Bartolucci  [marco.bartolucci@unipg.it](mailto:marco.bartolucci@unipg.it)  Department FISSUF, University of Perugia, Piazza Ermini, Perugia 06123, Italy

Color versions of one or more of the figures in the article can be found online at [www.tandfonline.com/uedg](http://www.tandfonline.com/uedg).

that are useful to the management of the own future, it enhances the ability of understanding of the own person and of the others, it strengthens the imagination skills” (Batini, Toti, & Bartolucci, 2016).

The reading benefits are then countless: from the empowerment of the literacy (Clark & Douglas, 2011), to the verbal intelligence and the overall knowledge about the world (Cunningham & Stanovich, 1998), as well as the social development of the person (Taylor, 1970).

When the reader immerses in a story, somehow identifies himself with each of the characters and tries to understand the purposes and to have the same feelings. The ability to attribute mental states to himself and the others is called “*Theory of the Mind*” or “*Mentalizing*” and is “a fundamental competence allowing the complex social relations that characterize the human societies” (Kidd & Castano, 2013).

An actual “simplified simulation of the reality” (Mar, Oatley, Hirsh, Dela Paz & Peterson, 2006) where the complex social dynamics taking place in our world are reproduced in the text in a realistic but simplified way, which helps us to understand them and to get into the protagonists’ mind. Reading is much more than the mere linguistic processing of words. The enjoyment of stories, in particular, triggers many different mechanisms in human knowledge (Mar, 2004). Readers represent what the text describes through mental images.

These representations are also known as “situational models” and incorporate information on space, time, causal relations, characters (Zwaan & Radvansky, 1998). Therefore, the brain regions involved in the understanding of the text are necessarily various and not only closely linguistic: probably, any network supporting language, memory and even the perception plays a role in this process (Mar, 2004). With regard to the understanding, strong brain activations have been found in the frontal regions (middle and upper frontal gyrus, ventrolateral and ventromedial areas, motor areas), in temporal regions (middle temporal gyrus, upper temporal gyrus, temporoparietal junction, lower groove and temporal poles) and in posterior cingulate cortex.

In particular, the activations of the frontal areas are relevant not only to select, integrate, organize information and to give an overall coherence to the story, but also for the codification and retrieval of episodic and autobiographical memories during the narration and, together with the temporal regions, for attributing intentions, goals, emotions and other mental states of the characters, or in other words in the process of *mentalizing*. At the same time, the reading activity produces changes in the brain connectivity (Berns, Blaine, Prietula, & Pye, 2013) not only as regards the areas destined to the linguistic processing (left angular and supramarginal gyrus and right posterior temporal gyrus) but also bilaterally in the somatosensory and motor regions (Geva & Yaghouh Zadeh, 2006).

In general, reading activates, at the cerebral level, an extended network of areas (Batini & Bartolucci 2014), operating at different cognitive levels, and constituting a veritable “*gym*” for the cognitive functions, such as the mnemonic or emotional functions (Billington, Carroll, Davis, Healey, & Kinderman, 2013), the executive functions and the processing speed of information (Uchida & Kawashima, 2008).

The aim of this test is precisely to check if reading can be therefore an efficient instrument for intervention in the event of cognitive decline. To this day we know that, albeit to a lesser extent, the neural plasticity remains active and substantial even in the third age (Fabel & Kempermann, 2008; Greenwood, 2007; Kramer, Bherer, Colcombe, Dong, & Greenough, 2004; Park & Reuter-Lorenz, 2009). Cognitive functioning is directly influenced by the extent to which a person develops relevant knowledge and skills in a specific cognitive domain (Ericsson & Charness, 1994; Masunaga & Horn, 2000).

The relevant knowledge in a specific cognitive domain, have a very important role in many activities such as the comprehension of a text, the understanding of the social context, the learning of new information (Hertzog, Dunlosky, & Robinson, 2008; Stine-Morrow, Miller, & Hertzog, 2006). Hertzog et al. (2009) claim that the growth of knowledge and relevant skills concerns most kinds of cognition as they are used in everyday life, creating a possibility for the optimization of the cognitive function, regardless of the fact that the basic mechanisms themselves can be trained or improved. In the light of this information, it is therefore assumed that a reading aloud training for subjects with cognitive decline can act as cognitive enhancement, since activating numerous brain areas

underlying both basic cognitive processes and higher-level functions, it can act as a promoter of neural plasticity.

## Methods

In this study will be presented the longitudinal results connected to an earlier study (Bartolucci & Batini, 2019). Initially a total of 43 patients of a RSA took part in the study, a control group consisting of 21 individuals (9 men, 12 women; M age 81.7 years, SD 6.43 years) and an experimental group consisting of 22 individuals (9 men, 13 women; M age 82.3 years, SD 10.14).

To divide the sample into experimental and control group we used the scores of the clinical dementia rating scale provided by the care home (total CDR 1 scores = rate of mild dementia and total CDR 2 score = rate of moderate dementia). The narrative training was been implemented in two different times: 40 meetings (an hour each, 5 days a week) between the first (T0) and the second (T1) survey with the RBANS battery and, one month later, 30 more hourly meetings before the third (T2) survey. The sample was reduced between the second and the third survey for health reasons.

For this article we report the results of the groups that completed the three surveys. The control group consisted of 12 subjects (5 men, 7 women, mean age 79.4 DS 7.3), whereas the experimental group consisted of 14 subjects (6 men, 8 women, mean age 82.4 DS 8.2). The training was carried out by a group of students who read aloud to the experimental group during the 70 total sessions (The part of the session that involved loud reading was of about 20 minutes, in particular at the beginning, up to an hour each with daily frequency, five days a week from Monday to Friday. Participants had the chance to speak about the story before and after the loud reading moment). Before the test training, students were carefully trained in group management, personal interactions, reading aloud (by a professional theatre actor) as well as in how to integrate within the private hospital.

Initially the texts were characterized not only by their overall shortness, but also by the period structure of the story consisting of short sentences so that the understanding was accessible even in situations of reduction of the memory and consequent impairment of the working memory. Then have been progressively inserted texts characterized by longer semantic units and longer overall duration. The same has been done as regards the level of linguistic difficulty, then after the first phase, we used texts not ended in only one reading day, thus requiring patients to remember the content of the “previous episode.” At the beginning and at the end of the session, patients were asked to share their thoughts on the reading material, allowing them also to relate to their personal memories. During the remainder of the session, the participant was asked to try to keep the attention and to listen. The control group went on with the usual program for this time of the day (i.e. watching TV). As noted above, after the first 40 meetings the neuropsychological battery was administered to both groups. One month later the experimental group began a new path of 30 further meetings, at the end of which both groups were subjected again to the neuropsychological tests.

## Results

The incoming data have been subjected to a preliminary analysis in order to assess any differences in the baseline of the two groups. In the first survey no differences have been found in none of the macro areas, between experimental and control group (through a t-test).

The data of the three surveys were then subjected to a repeated measures ANOVA (2X3) in order to assess any time effects but especially the interaction groups by time.

The analysis reported a significant difference regarding the time factor ( $F = 2.386, p < .005$ ) and the interaction group X Time ( $F = 1.878, p < .05$ ), which then indicates an effect of the training in the experimental group. Moreover, in order to assess the single subscales, has been done a pairwise comparison analysis to verify the effects in individual macro areas and sub tests.

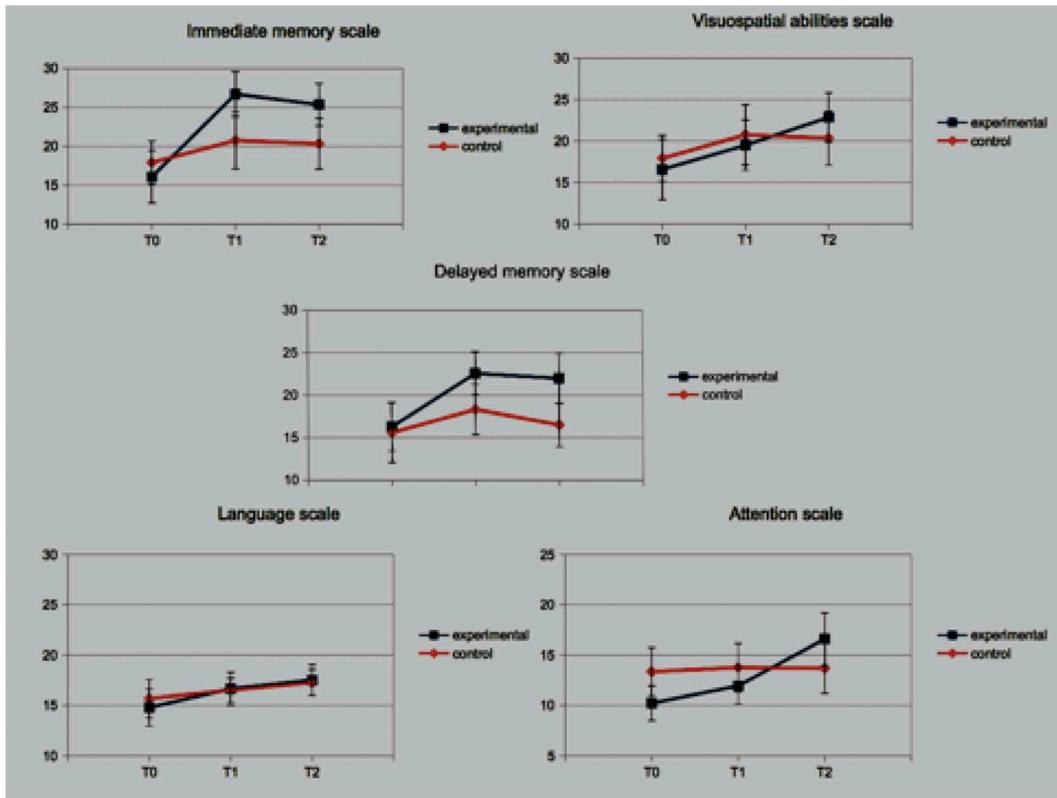


Figure 1. The results of the macro-areas of the three measures (mean for experimental and control group).

In Figure 1 are reported the results of the macro-areas of the three measures (mean for experimental and control group).

The pairwise comparisons show that the control group has not statistically significant differences among no survey in none of the macro areas. As regards the experimental group instead, between T0 and T1 there is a statistically significant difference for the immediate memory ( $p < .001$ ), and the delayed memory ( $p < .01$ ). As for the relation between T1 and T2 the significant difference is on the scale of attention ( $p < .05$ ). Finally as regards the comparison between T0 and T2 there is a difference (an increase) statistically significant with regard to the scale of immediate memory ( $p < .001$ ), the scale of visuospatial skills ( $p < .01$ ), the scale of attention ( $p < .001$ ) and the scale of delayed memory ( $p < .05$ ).

In Figure 2 are the graphs of the means in the two groups in the three measures for the sub tests that show significant differences.

As regards the control group there are no discrepancies, while for the experimental group the significant differences between T0 and T1 occur in the list of words learning subtest ( $p < .001$ ), in prose memory ( $p < .01$ ), in lines orientation ( $p < .05$ ), in coding ( $p < .05$ ) and in prose evocation ( $p < .05$ ). With regard to the comparison between T1 and T2 (still for the experimental group) the significant differences are in the lines orientation subtest ( $p < .05$ ), in denomination ( $p < .05$ ) and in coding ( $p < .01$ ). Finally, the experimental group shows differences between T0 and T2 (an increase) that are statistically significant in the list of words learning subtest ( $p < .001$ ), in prose memory ( $p < .05$ ), in lines orientations ( $p < .001$ ) and in coding ( $p < .001$ ).

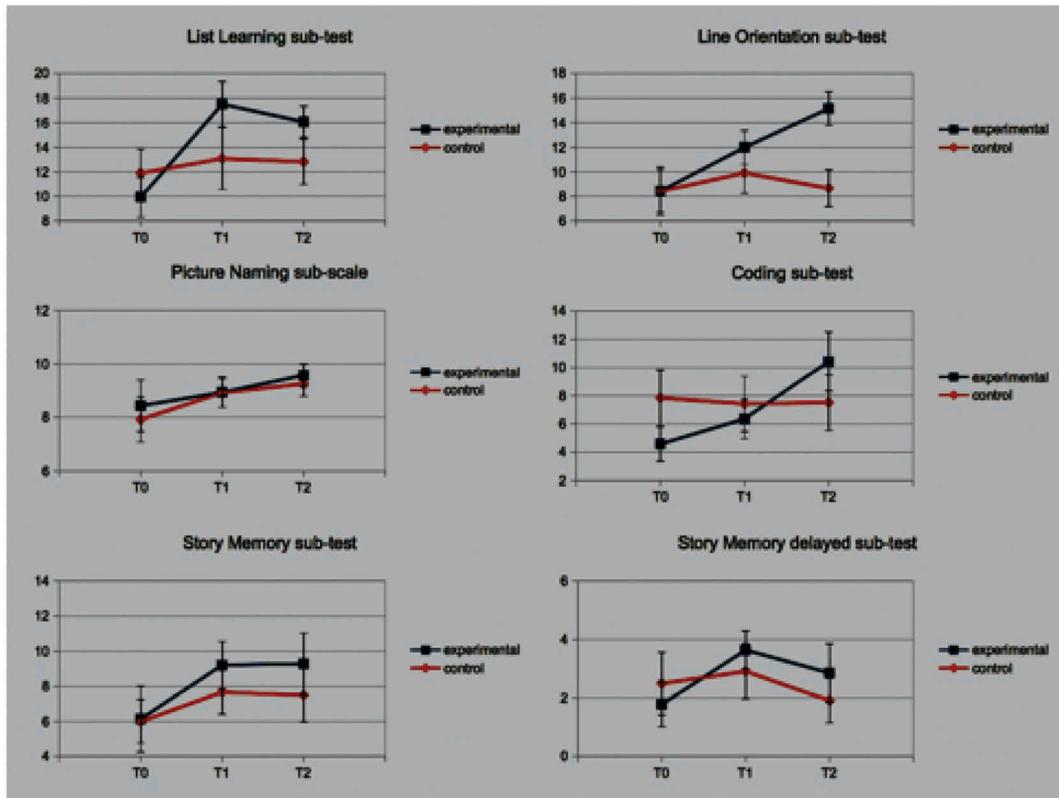


Figure 2. Graphs of the means in the two groups in the three measures for the sub tests that show significant differences.

## Discussion

Results show how the reading training can bring benefits from the cognitive point of view. By operating at a more cognitive level, the narrative listening activates areas destined not only to the linguistic codification but also attention areas, memory, motor and frontal visual areas. In this sense, in subjects with reduced cognitive activities – because of both the cognitive degeneration caused by the disease, and the (passive) living conditions of the individual who lives at the care home – this type of activity could serve as a real brain training. After the first 40 meetings, results show a statistically significant improvement as regards the domains of the immediate and long-term memory, which therefore seem the first domains to be influenced by the training

In fact, when we read a story, we use to fill the missing details in the text by using mental images that come from our own memory, and we are forced to compare our personal story or life events with the ones of the character of the story we are reading. In this respect, the access to own memories becomes crucial to be able to codify the meanings in the text. The sub tests of immediate and delayed prose memory are clearly the “closest” tasks to the training, while more counterintuitive are the improvements on the words learning, that is memory for not contextualized words.

In order to understand the story (or its individual parts) we must put into contact with our experience and knowledge our traces of verbal memory, our semantic categories, the images that we have in memory, our patterns of situation, in a continuous dynamic interaction between what we feel and what we already have in our memory.

This interaction on different levels would strengthen the weight of the trace of the memory of the verbal material and the narrative listening produces a training in the literal meaning, activating many processes at the same time, so involving multiple levels and cognitive domains. Therefore, the

training for the memory domains could be extended to other cognitive levels. In fact, the results of increase continue (not on the memory, which however keeps on the improving levels of the first 40 days) and concern the scale of attention and the one of the visuospatial skills. The supported and selective attention plays an important role in following the story and structuring a coherent interpretation in time. The advantages of this area are evident especially in the codification sub test, which assesses the ability of supported, selective and divided attention, as well as the working memory. An attentive and dropdown “awakening”, should produce further benefits on other cognitive abilities, and this is perhaps the case of the visuospatial skills (and the lines orientation sub test) which benefit perhaps also by the activations of the visual areas that the narrative is able to stimulate.

Finally, even if the language scale does not show an overall improvement in the experimental group, in the denomination sub test the subjects show an increase of performances indicating a positive effect on the linguistic areas and the retrieval in memory of language material. All data from this study seem to confirm the effectiveness of a narrative daily training in delaying the cognitive decline and maybe in improving the overall quality of life and perception of subjects suffering from documented forms of dementia. Future studies should take an interest in such effects on subjects in the early stages of the disease, but they should also examine how it might work as a tool of prevention in the normal aging, as well as in the borderline condition of mild cognitive impairment.

## Compliance with ethical standards

Author A declares that he/she has no conflict of interest. Author B declares that he/she has no conflict of interest.

## Disclosure statement

No potential conflict of interest was reported by the author.

## Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

## ORCID

Marco Bartolucci  <http://orcid.org/0000-0003-0718-8125>

## References

- Bartolucci, M., & Batini, F. (2019). The effect of a narrative intervention program for people living with dementia. *Psychology & Neuroscience, 12*(2), 307–316.
- Batini, F., & Bartolucci, M., (2014), Lettura, memoria, declino cognitivo: uno studio pilota. *Rivista Formazione Lavoro Persona*, anno IV-Numero 11
- Batini, F., Toti, G., & Bartolucci, M. (2016). Neuropsychological benefits of a narrative cognitive training program for people living with dementia: A pilot study. *Dementia & Neuropsychologia, 10*(2), 127–133. doi:10.1590/S1980-5764-2016DN1002008
- 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. (2013). A literature-based intervention for older people living with dementia. *Perspectives in Public Health, 133*(3), 165–173. doi:10.1177/1757913912470052
- Clark, C., & Douglas, J. (2011). Young people’s reading and writing: An in-depth study focusing on enjoyment, behaviour, attitudes and attainment. *National Literacy Trust*.
- Cunningham, A. E., & Stanovich, K. E. (1998). What reading does for the mind. *American Educator, 22*(1and2), 8–15.

- D'Alessandro, P., & Domanin, I. (2005). *Filosofia dell'ipertesto: esperienza di pensiero, scrittura elettronica, sperimentazione didattica*. Milano, Italy: Apogeo Editore.
- Ericsson, K. A., & Charness, N. (1994). Expert performance: Its structure and acquisition. *American Psychologist*, 49(8), 725. doi:10.1037/0003-066X.49.8.725
- Fabel, K., & Kempermann, G. (2008). Physical activity and the regulation of neurogenesis in the adult and aging brain. *Neuromolecular Medicine*, 10(2), 59–66. doi:10.1007/s12017-008-8031-4
- Geva, E., & Yaghouh Zadeh, Z. (2006). Reading efficiency in native English-speaking and English-as-a-second-language children: The role of oral proficiency and underlying cognitive-linguistic processes. *Scientific Studies of Reading*, 10(1), 31–57. doi:10.1207/s1532799xssr1001\_3
- Greenwood, P. M. (2007). Functional plasticity in cognitive aging: review and hypothesis. *Neuropsychology*, 21(6), 657. doi:10.1037/0894-4105.21.6.657
- Hertzog, C., Dunlosky, J., & Robinson, A. E. (2008). Intellectual abilities and metacognitive beliefs influence spontaneous use of effective encoding strategies. *Unpublished manuscript*.
- Hertzog, C., Price, J., Burpee, A., Frentzel, W. J., Feldstein, S., & Dunlosky, J. (2009). Why do people show minimal knowledge updating with task experience: Inferential deficit or experimental artifact? *Quarterly Journal of Experimental Psychology*, 62(1), 155–173. doi:10.1080/17470210701855520
- Kidd, D. C., & Castano, E. (2013). Reading literary fiction improves theory of mind. *Science*, 342(6156), 377–380. doi:10.1126/science.1239918
- Kramer, A. F., Bherer, L., Colcombe, S. J., Dong, W., & Greenough, W. T. (2004). Environmental influences on cognitive and brain plasticity during aging. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, 59(9), M940–M957. doi:10.1093/gerona/59.9.M940
- Mar, R. A. (2004). The neuropsychology of narrative: story comprehension, story production and their interrelation. *Neuropsychologia*, 42(10), 1414–1434. doi:10.1016/j.neuropsychologia.2003.12.016
- Mar, R. A., Oatley, K., Hirsh, J., Dela Paz, J., & Peterson, J. B. (2006). Bookworms versus nerds: Exposure to fiction versus non-fiction, divergent associations with social ability, and the simulation of fictional social worlds. *Journal of Research in Personality*, 40(5), 694–712. doi:10.1016/j.jrp.2005.08.002
- Masunaga, H., & Horn, J. (2000). Characterizing mature human intelligence: Expertise development. *Learning and Individual Differences*, 12(1), 5–33. doi:10.1016/S1041-6080(00)00038-8
- Park, D. C., & Reuter-Lorenz, P. (2009). The adaptive brain: aging and neurocognitive scaffolding. *Annual Review of Psychology*, 60, 173–196. doi:10.1146/annurev.psych.59.103006.093656
- Randolph, C. (1998). *Repeatable battery for the assessment of neuropsychological status (RBANS)*. San Antonio, TX: Psychological Corporation.
- Stine-Morrow, E. A., Miller, L. M. S., & Hertzog, C. (2006). Aging and self-regulated language processing. *Psychological Bulletin*, 132(4), 582. doi:10.1037/0033-2909.132.4.582
- Taylor, D. M. (1970). *Explanation and meaning*. Cambridge: Cambridge University Press.
- 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. doi:10.1007/s11357-007-9044-x
- Zwaan, R. A., & Radvansky, G. A. (1998). Situation models in language comprehension and memory. *Psychological Bulletin*, 123(2), 162. doi:10.1037/0033-2909.123.2.162