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# The Non-Fiction Picturebook: Knowing the World as an Integrated Experience

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**Il nuovo albo illustrato di divulgazione: conoscere il mondo come esperienza integrata**

The new non-fiction picturebook for children is conceived not just as an informational book, but first and foremost as a beautiful object, characterized by a largely visual and proudly creative approach to knowledge. By blending information and artistic illustration/design, transmission of data and sophisticated aesthetic experimentation, this medium seems to bring successfully together the rational/explicit and the aesthetic/intuitive way of attending to the world, with promising consequences for the development of an integrated learning experience. Applying the findings of cognitive sciences to the analysis of non-fiction picturebooks can be enlightening to understand the full potential of such books in sharing knowledge with children. Their intrinsic multimodality and ability to stimulate different parts of the reader's brain makes them valuable in any educational context revolving around the paradigm of complexity and having connection (as opposed to disjunction) of different levels of experience as its aim.

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Il nuovo non-fiction picturebook per l'infanzia è concepito e progettato non solo come un libro informativo, ma prima e più ancora come un oggetto esteticamente sofisticato, caratterizzato da un approccio alla conoscenza ampiamente visivo e orgogliosamente creativo. Intrecciando informazione fattuale e illustrazione artistica, trasmissione di dati e sperimentazione formale all'insegna del design e della bellezza, questo medium sembra saper conciliare con successo la modalità razionale/esplicita e quella intuitivo/estetica di rapportarsi al mondo, con conseguenze promettenti per lo sviluppo di un'esperienza di apprendimento integrata. Applicare alcune teorie delle scienze cognitive all'analisi dei non-fiction picturebook può essere illuminante per comprendere il pieno potenziale di questi libri nel presentare la conoscenza ai bambini. La loro intrinseca multi-modalità e abilità di stimolare parti differenti del cervello del lettore li rende strumenti preziosi in qualunque contesto educativo che sia incentrato intorno al paradigma della complessità e che abbia a cuore la connessione/integrazione (anziché la disgiunzione/frammentazione) di diversi livelli di esperienza.

**Keywords**: Picturebooks; Nonfiction; Knowledge; Children's Publishing; Integration.

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# 1. Introduction

Research in children's literature has recently started to focus specifically and systematically on the study of the non-fiction picturebook for children (Von Merveldt, 2018; Grilli, 2020, 2021; Goga, Iversen, & Teigland, 2021). Over the last decade, non-fiction books — especially in the picturebook form — have been possibly the most remarkable international publishing phenomenon in the world of children's books, both in quantitative and qualitative terms. More and more titles have been produced, many of which deliberately conceived not just as informational books, but first and foremost as beautiful objects, characterized by a largely visual and proudly creative approach to knowledge. As if by common accord, children's publishers everywhere have simultaneously given life to what can be considered a whole new medium, one that, by blending information and art, transmission of data and sophisticated aesthetic experimentation, seems to bring successfully together the rational/explicit and the aesthetic/intuitive way of attending to the world, with promising consequences for the development of a more integrated understanding of the world itself, and a possibly deeper connection to it.

As we know from the findings of the cognitive sciences, our vision of the world (and consequent way of relating to, and being in, the world) seems to be the outcome of an interaction between the left and the right hemisphere's perspective. In children, these two perspectives are still strictly intertwined. Young children's brain processing is more distributed and notably bilateral during the period of neuroplasticity, which explains why books that present information redundantly across processing domains — i.e.: simultaneously in more than one way (verbally and visually, analytically and poetically) — cater to children's natural processing, which is basically synesthetic (Curtindale, Bahrick, Lickliter, & Colombo, 2019). What's interesting about the new non-fiction picturebook (and its use of a multimodal communication), is that many titles do not target very young children, but older ones and even teenagers, thereby nurturing a synesthetic or intersensory kind of processing even in later stages of the reader's development, when transition to a less immersive and more self-conscious approach to the world typically happens (Crago, 2014).

Recent research in the cognitive sciences has shown that, even though some kinds of processing (especially automatic and domain-specific functions) do occur in lateralized modules, which makes it possible to theoretically distinguish a left hemisphere *modus operandi* from a right hemisphere one, lateralization of certain functions does not result in a literally divided brain: many cognitive tasks (attentional selection, meta-cognition, abstraction, problem solving, cross-modal association, for example) are in fact massively distributed, interconnected, and bilateral not only in childhood, and there is a constant collaborative division of labor between the hemispheres (Mashour, Roelfsema, Changeaux, & Dehaene, 2020). Cognitive scientists today definitely tend to concentrate on what, in our brain, entails bilateral processing and interhemispheric integration rather than highlighting what can be considered domain specific, because even if we can localize automatic functions, it is now believed that lateralization does not limit the processing to those locations. Both experimental research (Stein, Stanford, & Roland, 2009; van der Kaap & van der Ham, 2011; Jin, Liang, & Gong, 2020; Preisig *et al*., 2021, etc.) and cognitivist theories addressed to a wider audience mostly focus on the plasticity of our brain (Wolf, 2007; Oliverio, 2012; Cooper-Kahn & Foster, 2013; Oliverio, 2017; Damasio, 2022) and on the idea of a "whole-brain" (Siegal & Bryson, 2011) whose modules are capable of constant collaborative division of labor across hemispheres, rather than seeing them as separate and different.

For the purpose of this article, though, and being aware of the risk of an oversimplification, I deliberately choose to refer to the metaphor of a divided brain and to such authors as Hugh Crago and Iain McGilchrist, who have explored this concept with quite a radical approach (though with different declinations and even definitions), because I find that the application of their theories to the study of the new non-fiction picturebook can be enlightening as to the potential of these books in formal and informal education. In other words, even though the theory of a divided brain has not been experimentally demonstrated, I find it interesting precisely as a metaphor that can help understand the different levels on which these new books operate. Pure neuroscientists may be skeptical of theories like the ones by McGilchrist and Crago (who are, not surprisingly, remarkable humanists as well as scientists), because such theories struggle to find validation in laboratory experiments, yet those same theories are incredibly stimulating to reflect critically on what we, as a culture, have been privileging and nurturing, or else

neglecting and underrating, in our history (and more specifically history of education). The perspective of the present article is thus not strictly (neuro)scientific, but cultural, and aimed at highlighting what has often been overlooked, in education.[1]

The premise of Hugh Crago's original book *Entranced by Story. Brain, Tale and Teller from Infancy to Old Age* (2014) is that referring to the structure of the human brain can help understand many aspects of the literary experience. The author's argument is grounded in the belief that our two hemispheres perceive and elaborate the world in different ways. He uses the term Old Brain to refer to the archaic functions of the brain processed largely by the right hemisphere, and the term New Brain for the more detached experience of the world provided by the cortex and processed principally by the left hemisphere. While the instinctive, associative Old Brain thinks through images and feelings, the New Brain performs analytical thinking and abstract mental operations such as categorization. As we grow (as individuals and as authors/readers of stories), the New Brain grows in importance, substituting the left hemisphere understanding for the right hemisphere intuitive/epiphanic/entranced disposition. In Crago's theory, this transition is not without consequences, and the author seems to privilege and regret what gets lost in the process: the immersive experience, which he considers unjustly underrated both in literary criticism and in our culture in general, where a detached, analytical, and self-conscious attitude is considered more mature. A very similar cultural critique, grounded in cognitive sciences and applied more specifically to the educational field, is expressed by Contini, Fabbri and Mannuzzi in *Non di solo cervello* (2017).

A few years before Crago, Iain McGilchrist, in his monumental study *The Master and its Emissary* (2009) had gone even further in analyzing the workings of the brain as domain specific and, even more so, as essentially conflicting with each other. According to this scholar, in the Western world the complex interaction between the left and right hemisphere of the human brain, both at the individual and cultural level, has become more and more unbalanced in favour of the left hemisphere (McGilchrist, 2009). McGilchrist's idea is that "the story of the Western world is one of increasing left-hemisphere domination" (p. 237) and that this shift has had serious repercussions. "We can measure the consequences of the way we look at the world by what happens to it," (p. 176) he writes, alluding, among other issues, to the way we have been exploiting and destroying our planet with disquieting indifference, or lack of empathy. Interestingly, the same conclusion is reached by biologist Carol Kaesuk Yoon in *Naming Nature: The Clash between Instinct and Science*. In this awarded book the author highlights a conflict between two typically human tendencies — understanding the world through our senses and classifying it in more abstract/technologic ways — and advocates a return to a more immersive, sensory, intuitive approach in the field of science, too, as a necessary step to rekindle humanity's dwindling connection with nature (Yoon, 2009).

In educational terms, this implies that the way we teach our children how to look at the world (how to know it) is all important. What does a predominance of the left hemisphere — or of the New Brain — in Western culture mean, when it comes to teaching (both at the formal and at the informal level)? How does this affect the learning processes or the way the world is understood, and children's consequent relationship to it? Does radicalizing the difference between the workings of the two hemispheres — or of the two Brains — help, if we want to reflect upon the culture we have shaped?

Magnifying the separateness or the antithesis between our two hemispheres may be arguable in light of the complexity of the human brain, which seems to normally entail bilateral processing and interhemispheric integration. Yet, the original and audacious theories of McGilchrist and Crago do invite us to focus on what have undoubtedly become 'problems' of vision, of judgment, of values, in Western culture. By oversimplifying some mechanisms, their theories shed light on real cultural and institutional trends that can be better understood and possibly improved, reassessed, and redressed, thanks to their considerations. Which is why I will refer explicitly to these theories, and particularly to McGilchrist's analysis, in the present article.

According to McGilchrist, the most fundamental difference between the hemispheres lies "in the

1. Mary Midgley, the British philosopher known for her work on science, wrote an article on McGilchrist's book for "The Guardian" and her conclusions are: "McGilchrist's explanation of [...] our divided nature is clear, penetrating, lively, thorough, and fascinating. Though neurologists may well not welcome it because it asks them new questions, the rest of us will surely find it splendidly thought-provoking." ("The Guardian", Sat. 2 Jan 2010).

type of attention they give to the world" (McGilchrist, 2009, p. 4). To understand what can get lost, when the vision of one hemisphere predominates instead of complementing the other's perspective, it may be useful to provide a summary of the characteristics of the two hemispheres' approach to reality as explained by this cognitive scientist. We shall then see why and how the new non-fiction picturebook for children can be considered a uniquely integrated medium for re-presenting the world, able as it is to engage both parts of our brain and thus overcome the limits of a predominantly left-hemisphere perspective.

As we unfold, with Iain McGilchrist, some of the differences between the left and the right hemisphere's approach to the world, I suggest that we ponder over their specific implications on any teaching method, and particularly over the way we, in the Western world, have traditionally conceived informative books for children (the tools by which knowledge of the world is mediated for them). Associating the characteristics of the two hemispheres with the educational field in general and with informational books in particular can help us understand why both hemispheres should be at work, in any learning/knowing experience, and what the losses are, if one hemisphere is stimulated or reinforced at the expense of the other, as it has obviously been and still is the case in many non-fiction publications for children (not to mention in textbooks).

## 2. A very schematic summary of the characteristics of the left and right hemisphere[2]

The left hemisphere tends to deal with what it already knows and therefore prioritizes the expected. Its process is predictive. On the contrary, the right hemisphere is attuned to the apprehension of everything new and vigilant for the unexpected. (McGilchrist, 2009, p. 40). There is a tendency for the left hemisphere "to deny discrepancies that do not fit its already generated schema of things. The right hemisphere, by contrast, is actively watching for discrepancies" (p. 41). The left hemisphere is the hemisphere of abstraction. This, and "its capacity to categorize things once they have been abstracted, are the foundations of its intellectual power" (p. 50). The right hemisphere is the mediator of empathic identification (p. 53). It is "more intimately connected with the limbic system, an ancient subcortical system that is involved in the experience of emotions of all kinds" (p. 59). In all forms of emotional perception, the right hemisphere is involved. The right hemisphere can make inferences, an absolutely vital part of understanding the world. It deals with whatever is implicit, where the left hemisphere is tied to more explicit and more conscious processing (p. 71). The right hemisphere specializes in non-verbal communication, it acknowledges the importance of ambiguity: it is virtually silent, relatively shifting and indefinite, where the left hemisphere, by contrast, can be stubbornly convinced of its own correctness (p. 80). The left hemisphere needs certainty; the right hemisphere's tolerance of uncertainty is implied everywhere in its subtle ability to privilege means other than the logical speech (images, metaphor, poetry...). The left hemisphere has an affinity with public, rather than personal, knowledge (p. 93), while the right hemisphere finds it impossible to achieve/communicate knowledge in an impersonal way. The right hemisphere tends to "allow things to be *present* to us in all their embodied particularity, with all their changeability and impermanence" (p. 93). The left hemisphere tends to *re-present* the world in a form that is less truthful but apparently clearer, and therefore cast in a form that is more useful for control. The world it sees tends to be explicit, abstracted, compartmentalized, fragmented, static. From this world we feel detached, but in relation to it we feel powerful. Knowledge as it is provided by the right hemisphere permits a sense of uniqueness of the other. This knowledge is not easily captured in words. Knowledge as provided by the left hemisphere is the knowledge of what we call facts. Its virtue is its definiteness — it is fixed. It does not change from person to person or from moment to moment. It is general, formal, established, and disengaged (p. 96). To know something for the right hemisphere is never fully to know it at all, since it will remain forever changing, evolving, revealing other aspects of itself. To know for the left hemisphere is "to pin something down" so that it is "forever repeatable and repeated, so that it becomes routine" (p. 96). The left hemisphere is unable to conceive of meaning that

2. Where a page number is indicated inside parentheses, I am almost literally quoting McGilchrist, with some small variations to keep the argument fluid.

is not conveyed in words, but it is wrong to assume that meaning depends on language (p. 108). Denotative language enables, "not communication itself, but a special *kind* of communication, not thinking itself, but a special *kind* of thinking" (p. 114). Language, especially when it becomes written, brings the advantages of memorialization and fixity, but "its losses are in the picture as a whole. Whatever lies in the realm of the implicit, or depends on flexibility, whatever can't be brought into focus and fixed ceases to exist as far as the speaking hemisphere is concerned" (p. 115). The left hemisphere sees connotation as a limitation, since in the interests of certainty it prefers single meanings (p. 118). The right hemisphere "recognizes that things are never fully graspable, always imperfectly known. To these things, whatever they are, it exists in a relationship of care" (p. 174). The right hemisphere has a relationship of concern or care with whatever happens to be. Its assumption is that "the world is more like a living thing, a connected whole". And that the nature of truth is implicit or hidden. Its characteristics are "the primacy of perception, the importance of the body in constituting reality, an emphasis on uniqueness, and *creativity as an unveiling process*" (p. 177, my Italics). While the right hemisphere is caught up in "a sense of wonder at the very existence of the world itself", the mark of the left hemisphere is "precisely the opposite: to keep cool in the face of existence, to systematize and clarify the world, so that it is re-presented as an object of knowledge" (p. 178). The three means of argument — language, logic, linearity — "are all ultimately under left-hemisphere control" (p. 228). These laws make no sense to the right hemisphere which construes the world as inherently giving rise to ambiguity. This is much like the problem of "the analytic versus holistic understanding of what a metaphor is: to one hemisphere a perhaps beautiful, but ultimately irrelevant lie; to the other the only path to truth" (p. 228). The left hemisphere is "the controller of the 'word' " (p. 229). Together with its preference for classification, analysis and sequential thinking, "this makes it very powerful in constructing an argument. By contrast, it is hard for the right hemisphere to be heard at all: what it knows is too complex, interrelated, fluent, evolving, uncertain, never to be repeated, embodied and fleeting" (p. 229).

## 3. Words and images

Speaking more generally of the ascent of the left hemisphere at the expense of the right one in our culture, McGilchrist underlines that "the existence of a system of thought dependent on language automatically devalues whatever cannot be expressed in language; the process of reasoning discounts whatever cannot be reached by reasoning" (p. 229). Our mind as a whole, he claims, can intuit the existence of a reality beyond language and rationality. But language (the product of left hemisphere in a radicalized vision of lateralization) can hardly break out of the world language creates. We need something that can leap beyond the world of language and reason. Pictures, for example. The visual image (by its nature ambiguous, implicit, semantically multilayered) is the vehicle par excellence of the right hemisphere (p. 315). But images, especially 'artistic' images, are often considered an oxymoron in rational and scientific contexts (p. 340). Only plain, strictly descriptive, and functional illustrations can be accepted at that level: "In historical moments and cultural contexts where words prevail the image is thought of simply as an adornment, whose only function is to fix a meaning more readily in the mind — a meaning which could have been better stated literally. It is seen as an adornment that entertains or aids flagging attention, rather than as an indispensable part of understanding (p. 318)". This remark is true, when applied to many informational books for children that predate the new generation of non-fiction picturebooks and their radical 'pictorial turn' (von Merveldt, 2018). Indeed, the issue of a words/images divide presented by McGilchrist as crucial to understand the different workings of the left and right hemisphere can be used in any analysis of the picturebook as a medium (Nikolajeva, 2018). And it can be especially useful when analyzing the non-fiction picturebook, the words here claiming to be referential, not fanciful, speaking 'the truth', not telling 'a story', which brings an additional conflict between them and the illustrations, by their nature implicit, evocative, idiosyncratic, emotional, ambiguous, and more and more proudly and emphatically so, in recent non-fiction titles (Grilli, 2020).

Words, especially written words, substitute explicit for intuitive understanding (p. 318), but intuitive understanding is a fundamental part of our relationship with the world, and a mostly visual kind of communication, as is the communication employed by the new non-fiction picturebook, reactivates this deep form of understanding and makes it become an essential part of 'knowing'.

## 4. Interconnectedness and interdisciplinarity

Seeing the world through the right hemisphere implies "a respect for the existence of something at more than one level", a sense of interconnectedness of everything, and "a sense of interconnectedness of knowledge and understanding", too, the uncovering of "answering patterns across different realms" (p. 312). On the contrary, the left hemisphere, "with its categorizing drive, has a strong propensity not only to make divisions in knowledge where there are none in nature, and then to impose the divisions on nature, making the reality thus conformable to the idea, but to go further, and to convert the generalizations made from observations into positive entities permitting for the future these artificial creations to tyrannize over the understanding" (p. 53). Again, this is precisely what happens not in science itself (where the role of intuition, ambiguity, unpredictability, and interrelations is as essential as the role of rationality), but in much scientific teaching, where the rigidity of established categories — to be learned as such and kept in mind as a model — is normally upheld.

The new non-fiction picturebook's striking characteristic is its ability to overcome conventional classifications, and present the world in integrative, multifaceted, associative, and surprising ways. The new non-fiction picturebook is essentially multi-disciplinary in addition to being, like all picturebooks, multimodal: it very often draws on many areas of knowledge and uses many different means to convey its message. Its openness concerns both its content and its form. Content-wise, it tends to group elements of the world according to completely original denominators, mixing animal, vegetable, and mineral realms, living and non-living beings, natural and man-made things, far-fetched phenomena, whenever interesting or somehow connectable. In general, it does not simply provide discrete facts and data, but rather combines or juxtapose them in ways that call for inferences, interpretation, negotiation of meaning (see, for example, Gibert, *Chaque seconde dans le monde*, Actes Sud, 2018; Blexbolex, *L'imagier des gens*, Albin Michel, 2008; Gervais, *Des Trucs comme ci*, Editions des Grandes Personnes, 2021). Form-wise, it grants unusual space, importance and cognitive (vs decorative) function to the visuals: its illustrations are not only dominant within the page, but also often sophisticated, stylish, artistic, and therefore elusive and challenging (as opposed to denotative, strictly explanatory or neutral in terms of meaning).

## 5. Art as a gnoseological process

Art in general, states McGilchrist, can be seen as an endless expedition into the intuitable world, to subdue it to our comprehension, a kind of comprehension that no science could ever provide (p. 342). Art, with its reliance on implicit meaning allows us to circumvent the ordinary processes of everyday language or of scientific language, which inevitably return us to the already known and reduce the numinous to the quotidian or the clear. The purpose of art is "to impart the sensation of things as they are perceived, and not as they are known. Art exists that one may recover the sensation of life; it exists to make one feel things, to make the stone stony" (p. 412). This is precisely what the new non-fiction picturebook tries to do, with its insistence on shapes, colours, compositions: in general, with its powerful aesthetic apparatus. Our understanding of the world is partial, if we memorize information about its various aspects but don't 'feel' it, too. We need art, together with science and rationality, to get closer to the nature of things. Because the nature of things, McGilchrist insists, is not clear, explicit, explicable, as in our left hemisphere's beliefs: it is provisional, uncertain, changing, evolving, partly hidden, implicit. The more certain our knowledge, the less we know, claims McGilchrist; "the more we pinpoint something to be certain of it, the less we actually know it" (p. 201). The right hemisphere alone can get and is ready to accept the essentially unknowable nature of things, which is why it privileges artistic expressions (illustrations among them) over any final, certain, fixed, evident, clear communication; why it prefers what is indirectly expressed over the literal.

It is very difficult to think of a medium within which both stances, visions, attitudes can exist and intertwine, a medium that shows an openness to the provisional nature of knowledge (as in the right hemisphere's perspective) and yet delivers accurate information (embracing the left hemisphere's inclination). Yet the new non-fiction picturebook comes up as just such medium. The presence in it of written words, logical arguments, descriptions, and explanations, but also and most strikingly of a mag-

nificent, elusive, subjective, sensually engaging visual mechanism, speaks to the reader's brain as a whole. An oxymoron as it may seem, this new type of book is able to nurture involvement, rather than disinterested impartiality, while still providing objective data and facts; it is able to reconcile standardized instruction with subjective, sensitive, even emotional participation. Indeed, it seems to promote true understanding, in McGilchrist's acceptation: not a discursive explanatory process, but a moment of connection (p. 360).

Many new non-fiction picturebooks are books that deliver solid information in an aesthetically sophisticated way, combining accuracy of message with artistic whimsicality, satisfying the thirst for knowledge by appealing to the reader's senses and aesthetic sensitivity. While conveying accurate information, they aim to elicit a sense of awe before our world. In these books, and in their very construction, wonder is a key concept/agent (Grilli, 2020).

Plato considered wonder as the bedrock of all wisdom; Goethe thought that it was the ultimate disposition that man can attain; Wittgenstein was critical of scientific accounts of the world, which "leave us with the distinct impression that everything has been accounted for; they give us the illusion of explaining the world that we might do better to wonder at" (quoted in McGilchrist, 2009, p. 179). With the new non-fiction picturebooks we can have both. As in those rare moments in Western civilization where the two hemispheres were able to find a balance and reinforce each other's workings and visions (the ancient Greece, the Renaissance, for instance), these new children's books show that art and science can develop together, can dialogue, can enrich each other's perspective, making a special sort of seeing arise, in which both distance and empathy are crucial, both objective accuracy and personal engagement are possible.

It is their artistic nature that makes these informational books special, and different from more traditional non-fiction publications, where the written word, the logical argument, the linear communication dominates, and illustrations, if present, are anonymous (vs authorial), presented as objective, and in any case merely used to reinforce the verbal text. In the new non-fiction picturebook art is not used to adorn ideas with decorous clothing: it does bring new experiences and knowledge. By creating new, proudly personal, freely creative forms of expression to represent reality, the artists of the non-fiction picturebook enable us to see, for the first time, in our own experience, something that we hadn't seen before, or couldn't see in any other way. "They actually extend the scope of our awareness. They open up new branches and channels in our apprehension of the world" (see McGilchrist, 2009, p. 437).

But the role of art in these new non-fiction picturebooks is even more radical. Because they not only use illustrations in a bold, subjective and impressive way, compared to traditional learning books: they also often literally spring from a "visual idea" (Von Merveldt, 2018). Rather than providing descriptions/explanations/representations of the world based on long-established intellectual classifications, they often adopt a surprising angle, stemmed from what was, in the first place, a pictorial inspiration. If zoology is their focus, they may decide, for example, to showcase the animal world according to the different tails, furs, snouts, wings to be found in it, thereby associating species that are not usually held together but can suddenly be, by virtue of a visual metonymy working as common denominator (Stuart, Brannen, *Feathers. Not just for flying*, Charlesbridge publishing, 2014; Gutierrez, Fernandez, *Ojos*, Kalandraka, 2016; Gutierrez, Fernandez, *Bocas*, Kalandraka, 2018; Canty, *Heads and Tails*, Berbay Publishing, 2017; Pageaud, *Musée des Museaux Amusants*, L'Atelier du Poisson Soluble, 2018; Maki, *Animals Brag About their Bottoms*, Greystone Kids, 2020). Or they can opt for very big formats, so big as to allow lifelike size illustrations of animals (or of animal bodily parts) to be reproduced, where the focus clearly is the impressive perceptual effect, more than any analytic description (Jenkins, *Actual size*, Houghton Mifflin, 2004; Townsend, *Life-size animal tracks*, Book House, 2018; Schiavo, Grott, *Animali al 100%*, White Star Kids, 2018). If History is their subject, they can show (rather than explain) the social, political, urban, architectural changes of a place by keeping the same street as the fixed setting, portrayed from ancient times to our own days (Millard, Noon, *A street through time*, DK, 1998). Time as a complex and multifaceted concept can be dealt with by playing with a formal turn-of-the-page repetition, consisting in the reproduction of a double spread that displays, in the left and right page, many different 'before and after' situations (Ramstein, Aregui, *Avant Aprés*, Albin Michel, 2013). The weather as an extremely composite and varying phenomenon can be revealed by a collection of quasi paintings representing landscapes under endless meteorological conditions (paintings that undoubtedly add emo-

tional tones to the side-page textual description) (Teckentrup, *Alle Wetter*, Jacoby & Stuart, 2015). The notion of speed can be chosen as subject, and be presented by elegantly composing within the same page, and in each page, living beings and man-made objects characterized by the fact that they move at the same pace (1, 10, 200, 10.000 km/hour), with surreal plates resulting, in which a camel, a parachutist, a man on a bicycle, a Viking boat, and a bee, or a tennis ball and a professional skier, can live together (Crushiform, *A Toute Vitesse!*, Gallimard, 2013). The notion of space can be explored either by a sequence of images juxtaposing the inside and outside of many bizarre places and containers (Ramstein, Aregui, *Dedans Dehors*, Albin Michel, 2017), or by books that unfold vertically upwards and downwards to visually represent what we would find, were we able to look up into the highest skies (Gullain, Zommer, *The Skies Above my Eyes*, Words and Pictures, 2018) or beneath our feet to the centre of the earth (Gullain, Zommer, *The Earth Beneath My Feet*, Words and Pictures, 2017). Vision in the sense of optical perception can be investigated by showing the surprising relativity of it, in flip-up pages that reproduce the way different animals see the very same scene (Duprat, *Zooptique*, Seuil Jeunesse, 2013). Or colours can be chosen as the focus of information, and dealt with by creating a very thick collection of pages printed in every possible nuance of the chromatic spectrum, thereby providing a sensually unequivocal representation of what colours look like (in an incredible amount of variations), matched by a somewhat arbitrary name for each gradation, which seems to invite children to either agree or think about other possible solutions (Crushiform, *Colorama*, Gallimard, 2017). In this case, it is the visual dimension that provides the 'hard fact' information, colours being showcased for what they are, while the text is discretionary, unscientific, open to discussion.[3]

More in general, this being open-to-discussion is precisely the quality of knowledge as provided by the new non-fiction picturebook, its contribution to a teaching method aiming to bring back the involvement of the right hemisphere, with its specific understanding, in a scientific, rational, typically left-hemisphere dominated realm, as has traditionally been the world of children's non-fiction publications (just as many other contexts of knowledge communication).

As a corpus, the new non-fiction picturebooks published internationally over the last 10–15 years most certainly compose what can be considered *a literature of questions* (Sanders, 2018): i.e. a literature that, though dealing with the real world and wanting to inform about it, does not provide definite answers/facts/data that readers must simply memorize and store, but invites children to engage cognitively, aesthetically, sensually, and emotionally, suggests inferences, elicits connections, relies on intuitions because so much, in their pages, is implicit, hidden, polysemic, open to interpretation, and deliberately kept that way by means of an artistic (and in a broad sense even poetic), approach.

Learning books for children are traditionally required to be accurate, authoritative and indisputably reliable (Sanders, 2018). Yet, a non-fiction book does not necessarily have to provide precise or final answers about the real world. It can rather establish a dialogue with its readers, presenting information in a way that prompts questions, and even questions that may not have unequivocal solutions/explanations. These are perhaps the most interesting type of non-fiction books: not only because, by blending explicit material with implicit meaning or open interpretation, they engage both hemispheres of the child's brain, but because, as a matter of fact, they adopt the same approach as scientific enquiry itself, an enquiry that, together with rationality, impartiality and calculation, has always relied also on bodily perception, insight, moments of revelation, incongruous and even bizarre connections. In doing so, non-fiction picturebooks invite readers to follow and participate in the very process that leads to knowledge and understanding, instead of expecting children to simply accept conventional, pre-defined and ready-made findings or conclusions.

There are, of course, antecedents to this kind of non-fiction picturebook for children. One only

3. In the present article I am referring to some titles, but many others, written and illustrated by authors from many different countries, could obviously be mentioned as examples of picturebooks conceived and designed as thoroughly revolving around a visual idea rather than using images to illustrate what the written text explains. This creative approach to knowledge and information is typical of a huge corpus of non-fiction picturebooks, or, we could say, of the new non-fiction picturebook considered as a deliberate, coherent, international publishing phenomenon. One should only go to the non-fiction shelf of any children's bookstore to realize how widespread and lively this phenomenon is today. Which is why I have deliberately chosen not to focus on the detailed analysis of one or two specific books. My point in this article is to highlight the presence of a whole new trend of children's books that can blend art with science and engage the reader at multiple levels, not to indicate some specific titles as the perfect example.

has to think about some 1960- and 1970s titles by Iela Mari, such as *Mangia che ti mangio, L'uovo e la gallina, La mela e la farfalla* or *L'albero*, for example, or about some quite extraordinary picturebooks awarded with the 'Non-Fiction' BolognaRagazzi Award by Bologna Children's Book Fair during the 1990s and 2000s (Grandi, 2015; Goga, 2020). But these were scattered and random titles, while in these past ten years or so we have been witnessing the development of a new, systematic, deliberate publishing phenomenon, consisting in huge investments in the non-fiction section on the part of children's publishers all over the world. Their obvious intention is to creatively renovate this section as much as possible, by expanding its limits and its potential thanks to an artistic bent in the books' conception, design, and production.

The new non-fiction picturebook is not a schoolbook, of course, but the study of a very large corpus of recent titles of this type of book published worldwide suggests that introducing it into the classroom on a regular basis, and using it to deal with specific themes, or else to cross the bridge between different subject matters — as its composite nature allows — would enrich the formal teaching/learning experience and make it more integrated.

Children's books in general, and even more so picturebooks, by representing features in different modalities (i.e.: by presenting information redundantly across processing domains) can be a precious help in promoting a more holistic approach to learning. Lori Curtindale *et al.* refer to this effect as "intersensory facilitation" (2019, p. 285), and Ralf Thiede (2019) has pointed out that children's books can be very intentional in that regard and by design cater to synesthetic processing. The nonfiction picturebooks of new generation, by relying on both verbal and visual information, on creative formats, design and illustrations, on sensory stimulation, on the use of imagination, humour, metaphor, and other kinds of non-linear and non-analytical communication, while in any case dealing with factual information, very deliberately invoke multiple brain processes. In this way, they create the possibility that the two hemispheres operate in tandem, the possibility of integrating them in the reading process, which seems to be of utmost importance to nurture a creative and critical thinking (Wolf, 2007; Siegel & Bryson, 2011).

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