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Anatomy of a Broken Line: Why Zigzags Matter in Picturebooks

Anne Chassagnol

Shapes are at the core of pre-school picturebooks. Children at this stage are experimenting with letter formation and basic arithmetic. Identifying contours, colours, volumes and textures is a necessary step towards the acquisition of visual literacy. Numerous studies have been devoted to the role of geometrical motifs as a way of developing “children’s cognitive engagement with mathematics” (Elia & Van den Heuvel-Panhuizen, 2010), some focusing more specifically on round shapes and the infinite possibilities of a circle to teach geometry while others rely on quadrilaterals to explore angles, symmetry and volume. English children’s literature has always been influenced by authors who were themselves trained in mathematics, such as Lewis Carroll, whose publications in that field under the academic name of Charles Lutwidge Dodgson include *The Fifth Book of Euclid Treated Algebraically* (1868), *A Syllabus of Plane Algebraical Geometry* (1860), *Euclid and His Modern Rivals* (1879), and *Curiosa Mathematica* (1888). His literary work is infused with logic and geometrical concepts. *Through the Looking-Glass* (1871) is laid out as a chess conundrum, inspired by the knight’s tour problem (Abeles, Deleuze). In this famous mathematical problem, the knight starts on a random square on the chessboard and the *tour de force* consists in finding the best sequence of moves to ensure that he will visit all the squares just once. Geometry also plays a key role in the publications of A. A. Milne who studied mathematics at Trinity College, Cambridge¹. The American writer, Norton Juster, author of *The Phantom Tollbooth* (1961), was not a mathematician *per se* but his training as an architect gave him an appreciation of geometry to which he paid homage in *The Dot and the Line: A Romance in Lower Mathematics* (1963).

If traditional geometric patterns are readily available in concept books for pre-schoolers, few academic studies of children’s books have been devoted to “the strength of line” (Hintz & Tribunella, 2019), the most basic and abstract geometrical figure. Being both ubiquitous and utterly versatile, the line, which can morph into an infinity of shapes – a wiggle, a segment, a curve, a straight line or a zigzag – is highly underrated. The father of sequential art, the Swiss Rodolphe Töpffer (1799-1846), invented a new type of visual narrative in his *Histoires en étampes*, or *Stories in Etchings*. He also published a lesser-known book two years before his death, *Voyages en zigzag* (1844) in which he promoted school trips to educate children outside the classroom. These trips did not involve a traditional tour, let alone a *Grand Tour*, but

¹ See the poem “*Lines and Squares*” (1924) and Eeyore’s interest in letters in *The House at Pooh Corner* (1928).

excursions through walks in the Alps. Zigzags, for Töpffer became a form of geographical pedagogy – the art of meandering. They reveal the importance of rambling through physical space but also on the page, by connecting the text and its illustrations, by allowing fragmented, interrupted narratives through a series of digressions (Le Men, 39-40), just like the squiggle in *The Life and Opinions of Tristram Shandy* (1759) offers a visual reflection on the art of storytelling.

Tim Ingold's remark: "Lines are everywhere" and "subsume all the aspects of everyday human activity" (Ingold, 2007, 1) is true of children's literature, as the motif of the line seems to have become a sub-genre in itself (Greene, 1997; Whitman, 2009; Bossio, 2013; Lee, 2017). Lines appear in a variety of texts for young children, from alphabet books (Sharon Werner's *Alphabeasties and Other Amazing Types*, 2009), interactive books (*Andrew Drew and Drew*, 2012 by Barney Saltzberg), to concept books (*Shapes, Shapes, Shapes*, 1996, by Tana Hoban; *Length*, 1995, by Henry Arthur Pluckrose) and counting books (*1,2,3 San Francisco: A Cool Counting Book*, 2019, by Puck), challenging spatial skills and mathematical deductions. In *Follow the Line* (2006) or *A Line Can Be* (2015) by Laura Ljungkvist, readers are invited to run their finger along an uninterrupted trail, tracing words, solving riddles along the way, while eventually questioning the reliability of the line. *Harold and the Purple Crayon* (1955) by Crockett Johnson is emblematic of these picturebooks in which the whims of the pencil give shape to the story.

From a linguistic point of view, the polysemy of the term "line" points towards a rather fluid definition, which conveys a variety of meanings from a rope, to a track, a border or a direction. A line, as in "a line of argument", can also be interpreted as a pattern of reasoning, which suggests that it is both visual and narrative. By connecting two points, a line establishes a link between two separate units, giving them a sense of direction, the beginning of a storyline.

If the definition of a line seems straightforward, how could we define a broken line? In his pioneering essay on the impact of geometrical forces in painting, *Point and Line to Plane* (1926), Wassily Kandinsky attempts to define a broken line, also called an "angular line", which is composed of at least two parts, as "the result of two forces which have discontinued their action after a single thrust." (Kandinsky, 69). Do broken lines pertain to the category of "graphic codes" such as "blurs, motion lines, and the distortion of perspective" (Nikolajeva, 139)? This article examines lines in picturebooks, more specifically broken lines, zigzags and discontinuous or disconnected lines that meet at oblique angles. The term "picturebook" is intentionally written here in one word and refers to Martin Salisbury and Morag Styles' definition where image and text cannot be dissociated and should be understood as:

the particular use of sequential imagery, usually in tandem with a small number of words, to convey meaning. In contrast to the illustrated book, where pictures enhance, decorate and amplify, in the picturebook the visual text will often carry much of the narrative responsibility. In most cases, the meaning emerges through the interplay of word and image, neither of which would make sense when experienced independently of the other. (Salisbury and Styles, 7)

Broken lines, far from being a graphic mistake, represent a key stage in early literacy. Using Maria Montessori's concept of "psychogeometry", I will argue that one of the reasons why early picturebooks offer so many illustrations based on irregular lines, crosshatching or zigzags is because they introduce oblique shapes that will help pre-schoolers to identify the letters of the alphabet, preparing them, in turn, to form letters on a page. The second section will focus on the narrative value of broken lines and how they function as visual metaphors that are indicative of a disruption in the plot. Drawing on Scott McCloud's analysis in *Understanding Comics. The Invisible Art* (1993) devoted to the pictorial grammar of comics, I will investigate the "expressive potential of broken lines" (124). This section will contend that the sudden interruption of the line can be a comic mechanism to reactivate the story or can point to the discrepancy between the text and the image to signal dramatic tension. Finally, using the theory of visual perception and graphic design, I would like to suggest that broken lines, in their discontinuity, are essentially dynamic, thereby "implying more energy, more activity." (Nodelman, 161). This third and final part will identify a series of picturebooks in which broken lines animate the page by resorting to different strategies that either produce an illusion of movement by bringing back to life retro instruments pre-dating cinema, or, by faking digital media, mimicking *ipads* and computer games.

Lines and Letters: The Geometry of Early Literacy (Kress, 17)

The omnipresence of lines in picturebooks for the very young and concept books is not incidental or purely aesthetic. Zigzags, snaky, wiggly and crenelated lines, are intentionally used as a way of stimulating children's early visual literacy.

Maria Montessori (1870-1952), the influential Italian educator, pioneered an educational method based on training the senses. Initially conceived to suit the needs of mentally challenged children, she later adapted it to help pre-school toddlers. The very shape of the educational toys she used had a unique place in her pedagogical approach. She designed a series of self-instructive sensorial material – geometric insets, stacking cubes, miniature wooden stairs – encouraging children to experience geometry for themselves, before they were taught key concepts. Geometry plays a pivotal role in her method. It is mentioned in most of her publications, from *Psychogeometry* (1911), to *Dr. Montessori's Own Handbook* (1914), up to *The Montessori Elementary Material:*

The Advanced Montessori Method (1917)². Geometry and the impact of lines in space also stand at the core of the Swiss constructivist Jean Piaget's theory of cognitive development. In *The Child's Conception of Space* (1956) or *The Child's Conception of Geometry* (1960), Piaget conducted a series of empirical experiments on children on the impact of linear order, angular measurements, straight and divided lines, with the intention of improving their mathematical reasoning by manipulating geometrical shapes (Montessori, 1967)³.

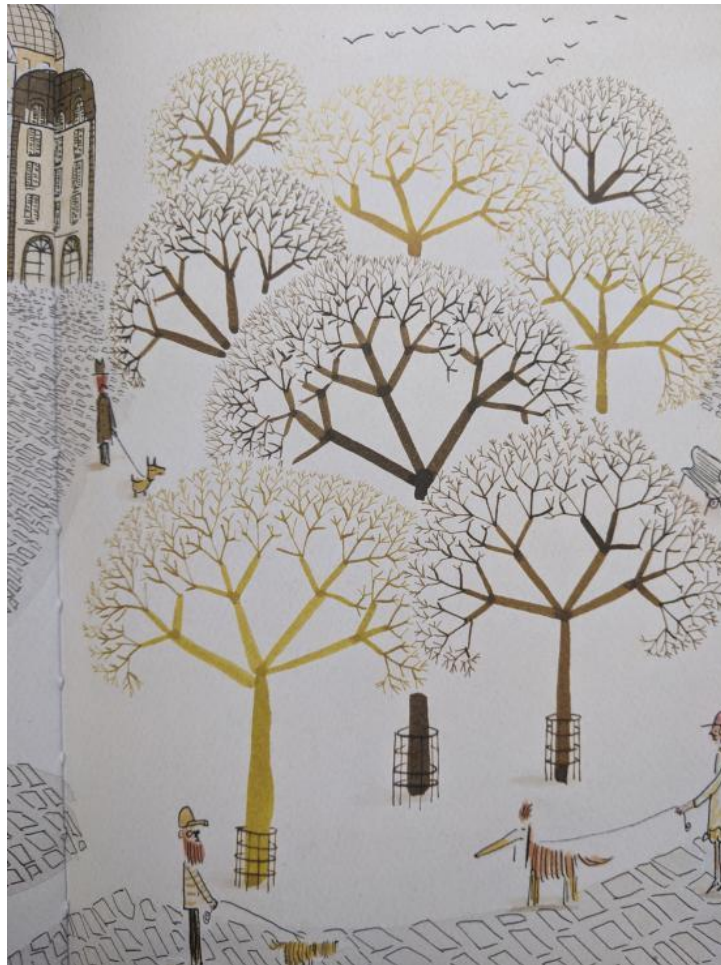


Figure 1 : Miguel Tanco, *Compte sur moi*, 2019. Traduction de Cécile Hermellin © Éditions Gallimard Jeunesse.

The story of *Count on Me* (2019) by Miguel Tanco revives the heritage of Maria Montessori. It reflects the importance of experiencing and visualizing maths in everyday life. It focuses on a

² See Montessori, *Psico geometría : el estudio de la geometria basado en la psicologia infantil*, Barcelona, Casa Edit, Araluce, 1934. Montessori, *Manuale di pedagogica scientifica*, Napoli, A. Morano, 1921. Montessori, *L'autoeducazione nelle scuole elementari*, Roma, Loescher, 1916. Montessori, *L'autoeducazione nelle scuole elementari*. Roma, Loescher, 1916.

³ Piaget, *La Représentation de l'espace chez l'enfant*, Paris, PUF, 1948. Piaget, *La Géométrie spontanée de l'enfant*, Paris, PUF, 1948.

little girl's obsession with lines. She detects mathematical concepts that materialize in her immediate surroundings. While the first part unfolds as a presentation of the narrator's upbringing in a mixed-raced family, exposing her budding passion for maths – a perfect cross between her father's artistic side and her mother's scientific mind, the second part offers an addendum, a self-reflective embedded book in the form of a fake maths diary. It is not exactly an exercise book but rather a copy of the notes that the narrator has assembled. The final pages encourage the reader to flick through the picturebook backwards to identify the fractals, polygons, and other solid forms on each page.

While Montessori crafted new “didactic materials” (Montessori, 1914, 18) to help primary school children acquire a sense of geometry through “conceptual manipulation” (Zuckerman, 2010, 130), she also focused on developing babies’ “specially refined form of sensitiveness” (Montessori, 1967, 48). In the 1950s, students attending *The Assistant School of Montessori Infancy* in Rome combined the work of the *avant-garde* graphic designer Bruno Munari (1907-1998), particularly his “machine inutile”, and the discoveries of Maria Montessori to create “The Bilancina Munari” (Munari’s multi-sensorial mobile for newborn babies)⁴. Bruno Munari was well aware himself of the recent advances in contemporary childhood education theories (Campagnaro, 82). The mobile which is still very much in use today in many nurseries is composed of an articulated structure with three supporting horizontal stems, holding four geometrical shapes in black and white. The principle is simple: once suspended above the crib, the shapes interact, producing visual stimuli through animated broken lines, illustrating Montessori’s belief that the visual repetition of a motif appeals to “the absorbent mind” of a child.

The child has a different relation to his environment from ours. Adults admire their environment; they can remember it and think about it; but the child absorbs it. The things he sees are not just remembered, they form part of his soul. He incarnates in himself all in the world about him that his eyes see and his ears hear. In us the same things produce no change, but the child is transformed by them. (Montessori, 1997, 48)

The lines and geometric shapes Maria Montessori designed for her didactic materials proved to be instrumental in her approach to child development. As the cortical maturation is in its early stages after birth, neonates find it easier to focus on geometrical, high contrast, shapes, especially when they appear in black and white (Banks, 1981; Bornstein, 2014). Shapes are often the first geometrical patterns that pre-verbal infants encounter in picturebooks, particularly early concept books. According to Bettina Kummerling-Meibauer and Jörg Meibauer, these books target

⁴ I am particularly indebted to Marnie Campagnaro for her precious help on tracing the origin of what is wrongly referred to as the ‘Montessori Mobile’ and for pointing out to me Silvana Quattrocchi Montanaro’s article, “Protogeometria: forma e dimensione nell’esperienza dei bambini nei primi anni”, *Vita Dell’Infanzia.*, n°11-12, 2005, p.47-54.

children between twelve to eighteen months and show single objects from the child's surroundings, such as a ball, a doll, an apple or a chair (14). They are designed to encourage visual literacy and develop the child's first lexicon (15). Discontinuous lines therefore function as iconic symbols. A jagged shape might represent a hungry predator. While a green triangular form might stand for a Christmas tree, regular broken segments might suggest a flight of steps, therefore indicating a movement upwards or downward. More generally, zigzags illustrate an iconic visual language. *The Noisy Book* (2010) by Soledad Bravi is aimed at children from 0 to 4 years old, each double page is composed of the visual description of a sound (a crying baby, a whistle, a kiss) and its textual explanation. Zigzags illustrate the irregular cracking tone of the drum ("the drum goes ratatat"), they depict the electrifying mane of a dangerous predator ("the lion goes roar"), or the explosive sound of the firecracker ("the firecracker goes boom") and in doing so they transcend the visual and the textual by introducing concepts such as boldness, fear, surprise or power.

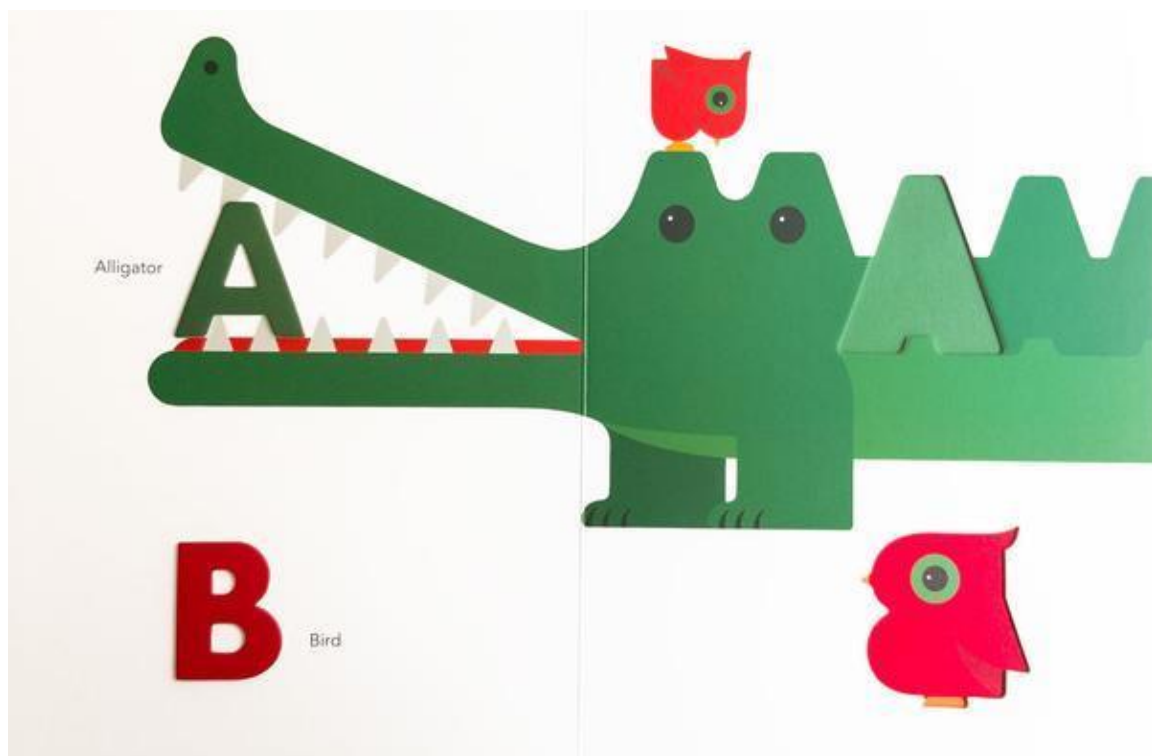


Figure 2 : Xavier Deneux, *ABC*, 2015 © Chronicle Books.

Alphabet books offer an interesting transition in early literacy as they typically match a letter to a sound. In *ABC* (2015) by Xavier Deneux, "A" is for Alligator and "B" is for bird. Nothing groundbreaking so far in terms of pairing, except that it might not be as simple as it seems. The image incorporates visual games, calling the attention of readers who are expected to detect the A-shaped mouth, teeth, and scales of the reptile but also to mentally fit the misplaced letter back

where it belongs. This involves identifying its outline as well as its interior shape. Some alphabetical letters are hollow so that the readers can actually run their finger along the contours to experience the shape of the letters, preparing them for the next step, not only to spell but also to write. Other picturebooks such as *Lines that Wiggle* (2009), encourage pre-schoolers to become more aware of line patterns in their immediate surrounding, in order to build up motor skills and prepare them for letter tracing. *Not a Box* (2006) or *Not a Stick* (2008), both by Antoinette Portis, prompt children to question the versatility of a simple object that can morph into a variety of items, at a time when they start experimenting with pencil strokes and the idea of breaking lines to write in lowercase and uppercase letters. Zigzags and interrupted lines are a common feature of worksheets and teaching resources. They help children master the ligature of the “W” or the slanted line of the letter “N”.

The schematic representation of objects and concepts in early children’s books is a necessary journey toward the acquisition of reading and writing skills. Tracing lines facilitates pencil control during letter formations; it helps keep the size of the letter within the boundary of the page, while the exercise can also be praised for instilling a sense of text directionality. In fact, from as early as the XVIth century up to the XIXth century, breaking the line as part of a writing exercise was one of the principles of samplers, which were used as an educational method, on textile rather than paper, to teach young girls the art of needlework, particularly as the practice of the marking of house linen remained a family tradition (Goggin, 318). The etymology of the word “sampler” goes back to the Latin “*exemplum*” and the French “*essamplaire*”, an example referring to the owner’s mastery of domestic crafts, ranging from drawing, darning, to embroidery. It was used both as an exercise in stitching *per se* and as a catalogue of motifs to pass on to future generations⁵. In certain embroidery patterns, the needlework is based on “a glottographic system, one that provides visible representations of spoken language utterances, for example, alphabets or verses.” (Sampson, 29). Subsequently, from the XVIIIth century onwards, samplers were indicative of a lesser-known social history of femininity. They document the intimate history of young women via significant dates – baptism, weddings, the birth or death of a sibling, initials, as well as the types of psalms learnt, while referring to local buildings and historical events. If samplers were initially a way of ensuring women a means of existence, and of achieving domestic literacy, they became a method, a grammar of ornaments, recycling repetitive motifs, – alphabets, crosses and Christian symbols, naturalistic motifs, rosettes,

⁵ See the website of The Victoria & Albert Museum: “Embroidery – A History of Needlework Samplers” <https://www.vam.ac.uk/articles/embroidery-a-history-of-needlework-samplers> (Accessed on January, 11 2020)

interlacing symbols, multiplication tables – to teach girls to write using a needle. As they became “an educational tool, lettering displaced pattern, literacy rather than stitchery took precedence.” (Goggin, 324; Humphrey, 6). Learning to write, learning to stitch, implied mastering the art of breaking the line by cross-stitching.

The Aesthetics of Accident: Zigzags, Narrative Tensions & Visual Communication

If the manipulation of motifs of broken lines is a key stage in the acquisition of writing skills and literacy, what might be the value of the discontinuous line from a narrative point of view? Or is it the other way round? Does the derailment of the narrative produce, on a graphic level, a series of broken lines? According to Maria Nikolajeva and Carole Scott, “the concept of the thread itself” is “metaphorically used so often to represent the thread of the story or narrative progression.” (Nikolajeva, 10). This is typically what is at stake in Serge Bloch’s *I Can’t Wait* (2005), *The Big Adventure of A Little Line* (2015), or in *Extra Yarn* (2012) by Marc Barnett. The question is not so much what happens when we follow the line but rather what happens if the line is interrupted. Does the broken line function as a structuring narrative device and if so, how does it operate?

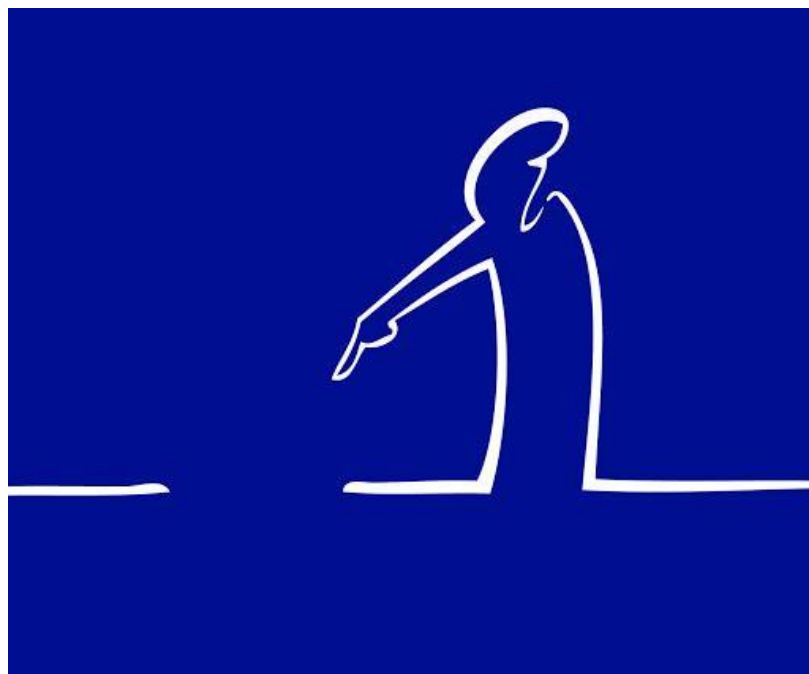


Figure 3 : Osvaldo Cavandoli, *La linea*, episode 101, 1978 © La Rai.

The Italian animated series, *La Linea* (*The Line*, 1969-71) by Osvaldo Cavandoli – which was initially a commercial for the cooking company Lagostina for the Italian show Carosello on La

Rai – explores the narrative potential of a simple straight line (Cavalier, 2011, 211). It stands, on a metaphorical level, as the tyrannical relationship between a creator and its creature. A male figure, M. Linea, drawn out of a white uninterrupted line on a piece of paper, rises to life and addresses his creator – who is only visible via his hand holding a pencil – and implores him to carry on drawing so that he can continue to exist. The segmentation of the line becomes the site of an ontological reflection on being and becoming, but it also questions what happens between the segments, in the void, where the viewer is not granted access. The series relies on a comic mechanism alternating between the different moods of the cartoonist – feeling either lazy, uninspired, slow, slightly jaded or, on the contrary, highly creative – and the character begging to be animated into existence. Each three-minute episode is structured on a what-happens-next scenario when the line is unexpectedly cut off. *La linea* exemplifies what Scott McCloud, in his picture plane pyramid of pictorial vocabulary, defines as “iconic characters”: “Most comics art lies near the bottom – that is along the iconic abstraction side where every line has a meaning. Near the line, but not necessarily on it! For even the most straightforward little cartoon character has a ‘meaningless’ line or two! (McCloud, 51).” The cartoon is technically silent but, here, the sequence of events is punctuated by the mumbling protagonist who exhorts the cartoonist to keep on drawing. As Vivian Carol Sobchack suggests: “The line constructs not only a figural narrative but also a narrative of figuration and thus provides an exhilarating meta commentary” (Sobchack, 257). Each episode ends with the character going off piste, in the abyss, as he is kicked off the page by his creator until the next episode. The broken line, in this case, is a visual storytelling device, based on comic relief mechanisms, used at the climax of the narrative arc to reboot the narrative process.



Figure 4 : Tomi Ungerer, *The Three Robbers* 1962/ *Les Trois brigands*, 1968 © L'École des loisirs.

In Tomi Ungerer's iconic picturebook, *The Three Robbers* (1962), broken lines offer a dramatic visual counterpoint to the traditional narrative of the orphan girl. When one of the brigands fractures the wheel of the vehicle carrying a screaming child, broken lines multiply within the illustration, conveying a sense of impending danger. The elegant position of the brigand's body, on tiptoes, delicately holding a massive weapon, and the zigzag motif on his head-dress, read as disruptive signs. A "Z" reappears on one of the men's hat when he kidnaps the little girl, who is safely tucked under his coat. The alphabetical letter ironically associates him with the famous masked hero, sly as a fox, stepping out of the night to rescue the innocent. In this example, the broken line heralds the upcoming sudden twist in the plot, taking the narrative off course, to deploy a new storyline. According to W.J.T. Mitchell, lines mark the vision of the narrative, and in that respect, the wheel appears as a revelatory "spatial form": "One of our most common spatial equivalent of literary action is the image of the wheel whose revolutions mark not just the time-line but the fortunes of the hero." (Mitchell, 288). In Ungerer's tale, the attentive reader is already privy to the fact that "the orphan named Tiffany" was heading in the wrong direction and that her destiny is about to change ("She was on her way to live with a wicked aunt. Tiffany was delighted to meet the robbers."). Ironically, as the etymology suggests, the apparition of their little *protégée* announces the robbers' new career path as Tiffany comes from the Greek "theophania", meaning "manifestation of God", in other words, Tiffany is the brigands' epiphany. The discontinuous line corresponds here to the unexpected discontinuity in the narrative. The treacherous title was all but a diversion – the Three Robbers are no villains after all.

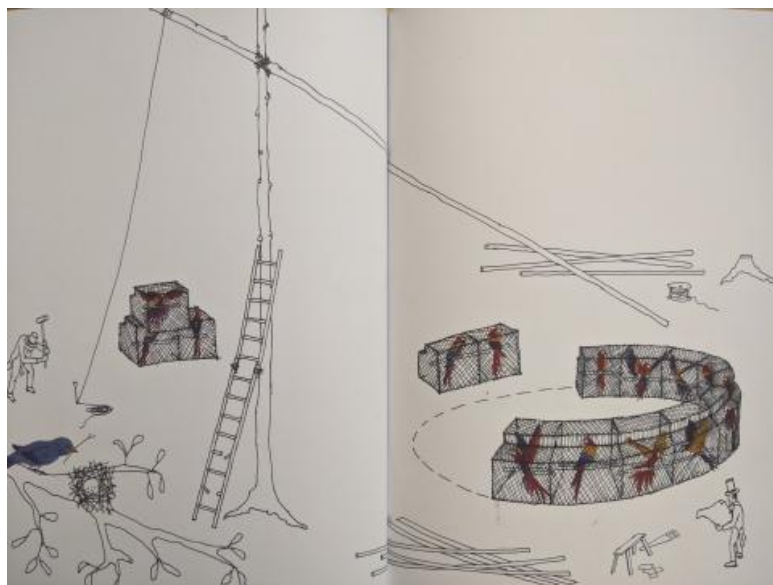


Figure 5 : Duncan Annand, *Caged*, 2018 © Tiny Owl.

Lines are equally deceptive in the wordless picturebook *Caged* (2018) by Duncan Annand. The complex architectural plot is mimetically erected like a building, through a series of beams that are being deployed rather laboriously by two amateurish builders. The book weaves simultaneously three different linear sequences of events: a blue bird on a branch building a nest; two eccentric gentlemen erecting a gigantic aviary; and a flock of parrots trapped in cages. The reader is visually challenged by the multiplication of acentric lines on the page cluttered with trees, poles, saws and wired cages – which seem to branch out into contrapuntal storylines to create a dramatic effect. The fragile equilibrium between the horizontal and the vertical poles reinforces a sense of imminent instability (Kandinsky, 138). On the right page, two men are invested in an anti-ecological economy, destroying the surrounding nature to sustain their project, ultimately burning the forest down to trap animals in cages. Meanwhile, on the left page, the bird's nest develops organically, recycling the leftover twigs to lay her eggs. On a cognitive level, the reader has to connect the lines and match the story on each page to make sense of it all. In that respect, *Caged* is a picturebook version of a game of stacking blocks, as it stimulates spatial reasoning through geometry (Casey, 2008). The construction of the birdcage is done by adding five different units, which eventually collapse when the blue bird sits at the apex. The complex juxtaposition of irregular lines, enmeshed and unstable, creates a narrative tension while revealing the potential playfulness of lines that are prone to gravity and can eventually yield. The sheer pleasure of the picturebook lies in its playful apparatus: the reader is invited to witness the structure being assembled, rather painstakingly, for the sheer pleasure of seeing it give way a few pages later.



Figure 6 : Dr. Seuss, *On Beyond Zebra!*, 1955 © Random House.

Dr. Seuss, the American author and illustrator, most famous for *How the Grinch Stole Christmas* (1957), *The Cat in the Hat* (1957) or *Green Eggs and Ham* (1960), uses zigzags in *On Beyond Zebra!* (1955), with the same playful intention of catapulting an established linguistic order. He unleashes the readers' creativity by encouraging them to experiment with extra letters to form the most incongruous sounds: according to this extended alphabet, "Wum is for Wumbus", "Thnad is for Thnadner", "Floob is for Floob-Boober-Bab-Boober-Bubs". The story starts in a classroom where young Conrad Cornelius o'Donald o'Dell brags about mastering the twenty-six letters of the alphabet to a friend whose "alphabet starts/Where (Conrad Cornelius') alphabet ends"), only to discover that Z might not be the last letter after all. As the narrator suggests, "there are things beyond Z that more people don't know." The protagonist becomes aware of a new linguistic dimension when he falls "flat on his face", after having recited all the letters he thought he knew. The illustration does not actually reproduce his collapse but it reveals his precarious situation on the chair. The white letters scribbled on the blackboard, particularly the Z, slightly askew, like a thunderbolt, mark the pivotal switch to an additional linguistic space ("In the places I go there are things that I see/That I never could spell if I stopped with the Z"). The red mysterious trigraph that appears on the board, composed of several broken lines, calls for a new linguistic experience: "So, on beyond Zebra! Explore! Like Columbus! Discover new letters!" Just as the zigzagging of the last letter Z on the first pages signals a sliding out towards a new phonemic awareness, Dr. Seuss questions the virtues of a simple, mechanical recitation of the alphabet and invites children to reflect upon "the phonological structure of the name of letters". (Treiman, 3). Broken lines are not a graphic whim: as an expression of visual communication, they signal an accident and mark the graphic deviation of the narrative.

Interactive Lines as Visual Forces: Energy, Rhythm and Speed

If the motif of the broken lines may be understood as a didactic tool, however, it cannot be reduced to an exercise in developing literary skills. As we have seen, zigzags and oblique angles are powerful unexpected signs that visually notify a counterpoint in the story. Geometrical shapes in a picture are also "dramatic visual forces" (Bang, xiii); lines, colours, sizes are displayed in order to affect the viewer in a particular way. In *Picture This. How Pictures Work*, Molly Brand uses the basic example of the oral tale, *Little Red Riding Hood*, to show how the choice of illustrations, their shape, their position, their size, might affect the readers and their understanding of the story. Her take is particularly original as she uses geometrical shapes to teach the art of

visual storytelling. By contrasting the impact of line, colour, size, length and width, along with perspective, she determines the emotional effect each may have on the reader. She uses the components of a well-known fairy-tale (the girl, the wolf, the trees, etc) that are symbolized by a geometric shape. When she raises the question of drawing the forest, she suggests using tilted lines rather than vertical rectangles because “(d)iagonal lines give a feeling of movement or tension to the picture” (Bang, 24). It would be incorrect to assume that broken lines can only suggest fracture or disruption; broken lines, zigzags, chevrons, have an energy of their own that electrify the image and create a visual palpitation on the page.

In *Point and Line to Plane* (1926), Wassily Kandinsky, who was interested in exploring new modes of expressions and particularly the combination of the five senses through synaesthesia, demonstrates how different lines project different emotions on canvas, depending on their positions. The opposite directions at work in an angular line can be understood as a graphic expression of a vibration. Kandinsky recalls that, in music “the line supplies the greatest means of expression”, its variation in width suggesting the modulation of the pitch of the instruments (99). The regular and repetitive pattern of broken lines creates a sense of tempo: zigzags produce a music of their own.



Figure 7 : Ezra Jack Keats, *Whistle forWillie*, 1964, / *Un garçon sachant siffler*, 2012 © Didier Jeunesse.

In *Whistle forWillie* (1964), Ezra Jack Keats, the author of *A Snowy Day* (1963) and winner of the Caldecott Medal, one of the most prestigious American children's book awards, relates a

small-scale experience in a deceptively simple form as the story retraces the relentless efforts of a boy called Peter to whistle for his dog, Willie. (Schwarcz, 183). Keats uses *collage*, which was not entirely new in children's books: *Sparkle and Spin* (1957), by the graphic designer Paul Rand, is another example of a ground-breaking picturebook using this particular technique inspired by geometric shapes (Alderson, 201). In Keats's picturebook, the pink jagged ornamental lines on Peter's jumper operate as graphic metaphors, mimicking his failed attempts ("Peter tried and tried to whistle, but he couldn't.") to produce a sound ("He blew till his cheeks were tired. But nothing happened."). The crescendo structure of the picturebook, based on the delayed expectation of the whistling sound, alternates between the absence of "visible sounds" on the page – no musical notes, nor onomatopoeia – and the visual modulation of the broken line, vibrating like an acoustic wave, striving to find a balance between high and low pitch. Peter's jumper seems to morph into an oscilloscope, allowing the reader to visually experience the perception of a sound about to be produced (Schwarcz, 77). The zigzag pattern of Peter's top is visually efficient on two levels, not only does it reveal the inchoate sound effect, his attempts to whistle, but it also renders visible the otherwise invisible expression of the boy's emotions – fluctuating between failure, persistence, confidence, to self-empowerment⁶. To produce this sound, Peter subjects his body to a series of sensorial experiences – he sets his body into a spin, hides in a cardboard, experiences isolation, defies gravity by running away from his shadow; he disappears from the page, before duplicating his image in a mirror "to practice whistling". The title itself with the unusual absence of typographic space between the preposition and the proper noun ("forWillie") seems to reproduce the lack of necessary pause to form the sound by holding one's breath. While zigzag patterns are omnipresent in the image, the text invites the reader to identify the "W" letter words and attempt to pronounce each occurrence on the page ("wished", "whistle", "whirled", "wink", "sidewalk", "grownup", "walked", "shadow", "who", "way"). On the iconic book cover, the zigzag motif of Peter's jumper points toward the dog, as the triangular shapes of the lines suggest a direction. In *Reading Images, The Grammar of Visual Design*, Gunther Kress and Theo Van Leeuwen have shown the visual semiotic effect of this geometrical triangular form:

the triangle, especially when tilted, is a (fused structure of a) participant and a vector, because it can convey directionality, point at things. The meanings it attracts are therefore less like 'qualities of being' than like processes. (...) Triangles are a 'symbol of generative power', and represent 'action, conflict, tension' (Kress, 55-56).

⁶ See more specifically McCloud, Chapter 5, 'Living in Line', *Understanding Comics. The Invisible Art*, New York, HarperCollins, 1993, p.118-137.



Figure 8 : David A. Carter, *White Noise*, 2009 © Tate Publishing. Photo © Blog *Lines Between*.

If visual illustrations can convey a musical impression on a two-dimensional page, pop-up books can attempt to produce proper sounds, using volumes and textures, on an animated page. In *White Noise* (2009), David Carter explores the potential of irregular lines to create a variety of sound effects with paper and page. Carter creates a specific type of noise made by the combination of all the possible frequencies of sound available. The front cover of the book is a white crenelated circle, containing the title, on a red background. The title seems to propose a chromatic equation, attributing a colour to a sound (white noise equals white hue). When brushed, the herringbone surface within the circle produces white noise, which is believed to have soothing effects on babies. The unusual texture invites the readers to feel the cover to experiment with the unique swishing sound. The indentation facilitates a vibration, a combination of sound and movement that is achieved through the use of broken lines. Describing a similar shape, Molly Bang concludes that explosive circles with spiky edges trapped in a rectangle produce a flashing effect:

The rectangular frame of the picture forms a separate world inside itself. The edges enclose our attention and force it inward, and we are (usually subconsciously) aware of the rectangle's center. The frame creates a sort of visual conflict that can be thought of as a radial force, directing our attention inward from the frame midpoint. (...) the center of the picture also radiates energy out of itself. You can sense this even more strongly when the picture frame is square or round. (Bang, 76)

Although a zigzag line might be perceived as an erratic, unintentional geometrical figure, its multi-directionality, its versatility, allowing a mere segment to transform into a variety of shapes (a stratified soil, an arborescence, a volume, a grid, or the complex metallic structure of a building), is indicative of its dynamic quality.



Figure 9 : Agathe Demois, *The Great Journey*, 2015. *La Grande Traversée*, 2014 © Seuil jeunesse.

In *The Great Journey* (2015) by Agathe Demois and Vincent Godeau, the red criss-cross patterns of lines covering the ten double-page decors representing a series of various settings (a forest, a kitchen-garden, an ant's nest, a factory, a cityscape, a station, a boat and a jungle) act as an optical illusion, hiding multiple seditious activities. The book comes with a red magnifying glass urging readers to scan the page to uncover illustrations in blue, camouflaged under the red drawings. By so doing, readers are invited to question the reliability of the images, since it soon becomes apparent that what is visible is only a fraction of the image: what they have seen is not only partial but static. The red round tree with its complex system of indented leaves, on closer inspection, is not an element of vegetation but rather a peacock spreading its tail. The enmeshed pile of twigs that, at first glance, seemed organic and unstructured turns out to be a very effective decoy, teeming with life, to lure predators away. The cross-section unveils a social architecture designed to optimize the ant's nest. *The Great Journey* is in fact a double expedition. It follows the migration of a bird from page 2 to page 24 through various landscapes but it also implies a non-linear reading protocol, as the reader has to scour the page, both vertically and horizontally, to identify the hidden pictures in blue under the red drawings and then proceed to connect them to each other, as they operate in a sequential mode.

Interlaced stripes can also produce a much more dynamic image, as it is the case in kinetic art, which relies on an optical illusion and distorts the viewer's perception by juxtaposing, or

superimposing, black and white geometrical lines⁷. In his pop-up books, *Gallop!* (2007), *Waddle!* (2009) and *Kick!* (2008), Rufus Butler Seder relies on visual trickery to create an impression of movement by simply asking the reader to turn the page. The mechanism recalls the origins of animation, particularly Victorian devices, which allowed a sequence of images spinning on a cylinder to form a single image. Seder's books also rely on the practice of "Ombro-cinéma", which he refers to in each of the subtitles, "a book in scanimation". "Ombro-cinéma" is a slightly more modern invention dating from the late 1920s and based on a barrier-grid system of animation. To activate the image, the reader needs to slide a rectangular piece of transparent paper with vertical lines on hatched silhouettes. Once the reader turns the page, the horse in *Gallop!* is set into motion when the two drawings made of interrupted hatching lines overlap, thereby creating an illusion of motion.



Figure 10 : Michaël Leblond and Frédérique Bertrand, *Paris en Pyjamarama*, 2014
© Éditions du Rouergue © Photo ohpopup.canalblog.com.

The interactive dimension of broken lines is also visible in the animated picturebook *Paris en Pyjamarama* (2014) by Michaël Leblond and Frédérique Bertrand, where images come to life. Leblond uses "Ombro-cinéma" horizontally. Movement does not occur when the page is being turned but as soon as the reader slides a striped acetate grid along the surface of the illustrations. When the sheet moves along the open book, the blurred illustrations on the page finally make sense and become animated. The dramatization of broken lines creates a complex image vibrating

⁷ see <https://www.tate.org.uk/art/art-terms/k/kinetic-art> (Accessed January, 13 2020)

with energy (Kandinsky, 76). The metallic structure of the Eiffel Tower sparkles, the visitors of the Pompidou Centre go down the zigzagging escalator, passengers move along the crisscrossing lines of the metro, the wheel of the Moulin Rouge starts spinning round, even the intricate design of Notre-Dame's stained glass windows can be seen glittering in the night. The superimposition of diagonal lines and dots on the page produces what Kandinsky describes as a sense of "inner pulsation." (Kandinsky, n.p). If broken lines produce an optical illusion of movement, the reader has full control over the magic of the book.

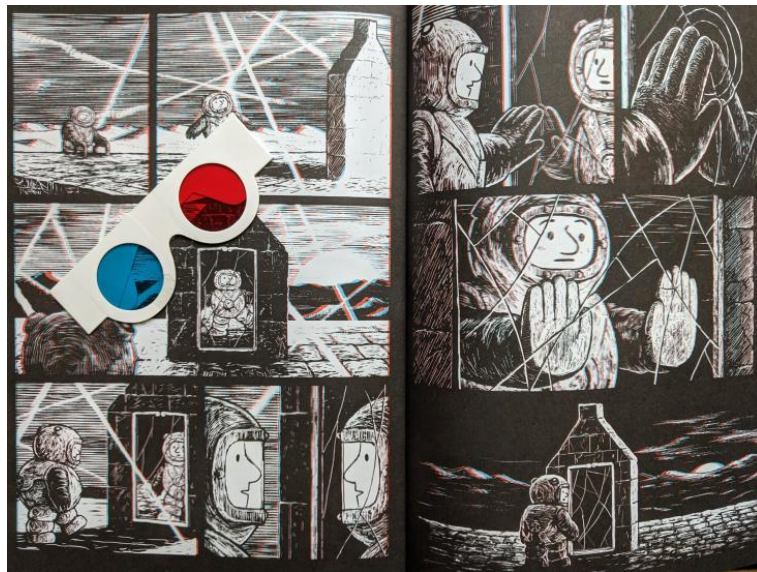


Figure 11 : Matthias Picard, *Jim Curious. Voyage à travers la jungle*, 2019 © Éditions 2024.

The superimposition of lines can also create an immersive cinematic experience as it is the case in the visual narratives of Matthias Picard, who uses anaglyph 3D images in *Jim Curious: A Voyage to the Heart of the Sea in 3D Vision* (2014) and *Jim Curious, Voyage à travers la jungle* (2019)⁸. The book uses three colours, red, blue and black. The flat page reveals a tri-dimensional *tableau* once colour-coded glasses provided inside the books are worn. With the glasses, the book loses two shades and seems to present a black and white décor. The 3D effect is achieved by a slight discrepancy between two overlaid images in red and blue that are both chromatically opposed and meant to be read by each eye separately with the glasses to produce depth of field. Wordless storytelling is not particularly unique as such. What is novel here is the combination of two storylines: a Carrollian *Through-the-Looking-Glass* narrative with a Conradian *Heart of Darkness* scenario in an environment, apparently deprived of oxygen, and abandoned by humans.

⁸ An anaglyph is a stereoscopic motion or still picture in which the right component of a composite image usually red in colour is superposed on the left component in a contrasting colour to produce a three-dimensional effect when viewed through correspondingly coloured filtered in the form of spectacles. (Merriam-Webster)

Jim's journey in his clunky spacesuit starts when he chases a dragon-fly through a mirror. The initial passage into another dimension is signalled by the reflection of a Z frame door, revealing a portrait of another man with a surprisingly similar suit and stereoscopic glasses. The title of the book ironically points to Jim's curiosity, while the double reflexive nature of this mysterious visitor in the mirror sparks the reader's inquisitiveness – could he be the protagonist? Did he journey there and back again? Could there be someone else out there? While the glasses are a useful aid for perceiving an additional dimension – the picturebook remains undecipherable without their help – the turning of the page fails to catch up with the central character who is always one step ahead of the reader, hiding within the decor. As soon as Jim goes through the looking-glass, there is a change of paradigm, from the graphic novel to the protocol of the video game. The character is set into motion through situations – an escape room, visually impaired sets, infested waters – commonly found in videogames, each corresponding to a different level of the game. Within each page, broken lines, whether they appear through diagonal lianas or oblique pillars, hinder the progression of the character who is on a course to complete his mission. This hypnotizing journey, which started with a dizzying sense of seeing too much, of catching a glimpse of a dimension that cannot be achieved with paper, ends with an overwhelming sensation of heat. The mirror is cracked, lines lacerate the page, as the light is diffracted and radiates from the lighthouse. Matthias Picard's wordless masterpiece illustrates the multi-sensory quality of broken lines. Jim's curious journey is a *voyage out*, beyond paper.

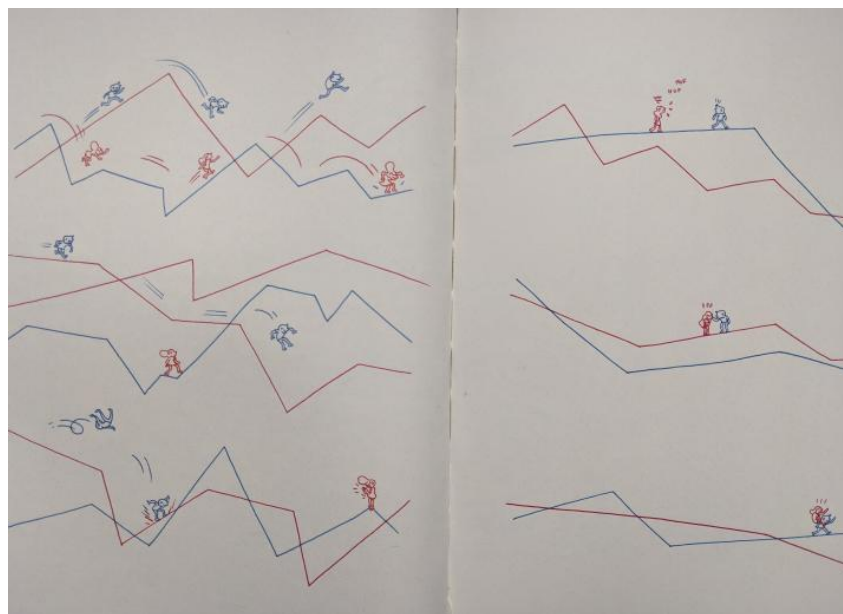


Figure 12 : Victor Hussenot, *The Land of Lines*, 2017/ *Au pays des lignes*, 2014 © La joie de lire.

Other interactive picturebooks mimic the protocols of digital media. In the wordless picturebook *The Land of Lines* (2017) by Victor Hussenot, the sequential visual narrative is inspired by the culture of video games⁹. The story, told initially in bichromy, relates the adventures of a boy, in blue, and a girl, in red, as they progress in a landscape of broken lines that assemble themselves and recompose, according to a different pattern on each page. The irregularity of the line affects the context, by modifying volumes and perspectives, to produce a variety of intricate gamescapes. Broken lines can also morph into a series of obstacles that the characters need to overcome, if they wish to proceed forward. The repetitive use of zigzags partakes of the gamification of the story progressing in a non-linear, interactive dimension, as the game is played on a dual level (Egenfeldt-Nielsen, 7): the red and blue figures need to find a way out, while the reader is invited to locate them on the page and follow their tactical moves. Broken lines, as a graphic tool, create a visual dynamic that animates the image. The actions of the characters, requiring speed when they fall, slide, or jump, are often accompanied by a short line underlining part of their body, emphasizing a gesture, its intensity, or an emotion which seems to transform the figure into a GIF that can loop continuously. This is even more apparent in the second part of the book, when Hussenot introduces a third colour: each figure with its distinctive, flashing tonalities, red, blue or yellow, can be individually located on the page. In *The Land of Lines* (2017), Hussenot transposes the codes of video games and uses irregular lines to shape and pace the story, and by doing so he creates a fiction within the fictitious space, which consists in letting the readers believe that they have become players, rather than readers. From the author's perspective, broken lines offer an illusion of improvisation; while from the reader's point of view, they "map out the networks of possible player choices in a scene" and simulate his immersion in a parallel media.

Zigzags have become a fundamental component of a particular immersive category of picturebooks that attempt to reinvent the traditional text-image articulation by using digital media techniques largely based on broken lines. *Jim Curious*, *The Land of Lines*, *Gallop!*, or *The Great Journey*, all require "a nontrivial effort [...] to allow the reader to traverse the text." (Aarseth, 1). They either require the use of an optical instrument (a pair of glasses or a sheet of rhodoid) to read the image or they imply a specific strategy to navigate through the book. Readers are no longer passive, they have no other choice but to gamble their way forward, and decide whether they wish to follow a line to proceed further. The broken line, as a geometrical motif, no longer stands for a mishap, on the contrary, it is a prop that empowers the reader.

⁹ See Hussenot, <https://www.du9.org/entretien/victor-hussenot/> (Accessed January, 13 2020)

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