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# Beyond the Shadow of Z: Non-Linear Reading and Experimental Approaches to Comics

*Au-delà de l'ombre du Z: lecture non linéaire et approches expérimentales de la bande dessinée*

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# Beyond the Shadow of Z: Non-Linear Reading and Experimental Approaches to Comics

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## Introduction

- 1 The present article<sup>1</sup> proposes to approach the question of comic book reading from the double perspective of theories developed in the field of comics studies, and empirical approaches based on eye-tracking technology. The aim is not to offer a systematic study of this or that phenomenon based on experimental data, but rather, in a more general and exploratory way, to reflect on how eye-tracking technology could be used for something other than defining an average progression reflecting the sequential articulation of the panels within the page. Based on the premise, often evoked in the field of comics studies, that the panels are articulated according to a double logic, on the one hand sequential, and on the other hand non-linear, we would like to offer some perspectives allowing to show how the empirical approaches could be exploited in order to enlighten this double articulation.
- 2 The first part presents a synthesis of the main theoretical models aimed at describing the media specificities of comic book reading, focusing on a dimension that has received, until now, little attention from experimental approaches. Besides linear reading, progressing according to the typical Z-shaped reading trajectory highlighted by observations using eye-tracking, we insist on non-sequential approaches to reading, while evoking, moreover, a particular type of sequential articulation: the sequence that we will call “chronophotographic”.

- 3 The second part is based on data collected through empirical research on comic book reading according to publication medium. Without going into this problematic, which is dealt with elsewhere (Baroni, Kovaliv, and Stucky 2021), we wish to divert this research data in order to outline some avenues likely to renew a field of research that has so far been focused essentially on the objective of describing a conventional pathway on the page. It is not a question of pretending to offer a systematic panorama of these possibilities, but of showing, through two examples which seem to us to be quite eloquent, the way in which one can interpret a posteriori some results of the research to approach comics devices rarely studied in an empirical perspective.
- 4 This will be the case, in particular, of a type of reading associated with a genre (the humorous Franco-Belgian comic page) and with a specific narrative structure (the use of a mystery panel requiring a rereading after the resolution of the gag). This particular case will allow us to show how a certain configuration of the humorous graphic narrative induces, for most readers, a deviation from the typical Z-progression, while fitting into a rather conventional stylistic and narrative register. This example shows, among other things, how the parameter of genre is likely to influence the reading path by mobilizing processes that oppose the more linear progression of a graphic narrative deployed on several pages.
- 5 The second analysis is interested in a type of sequence that can be frequently observed in the same corpus, but which has received, until now, very little attention from comics specialists. We will be interested in the burlesque sequences based on a decomposition of the movement of a character, a device inspired by the cinema for its thematic and by the technique of chronophotography for its graphic form. These sequences, which we will qualify as “chronophotographic”, are characterized by what Mikkonen and Braithwaite (2023) define as a “figurative solidarity” (FS) pushed to its maximum, inducing interesting phenomena concerning the rhythm of reading and the effects linked to this sequential subsystem, whose perceptive seizure is very fast. We will verify, on the one hand, that this subsystem is characterized by an acceleration of the reading, and we will show, on the other hand, through the interpretation of an isolated case of apparently deviant reading, how this process can be exploited to produce a graphic narrative with double trigger.
- 6 This particular case will also be an opportunity to reflect on the methodology and the purpose of empirical approaches to comics reading. In this article, we propose to complement quantitative approaches with qualitative approaches, based on the a posteriori interpretation of surprising reading paths and on the consideration of apparently deviant readings. As the many researchers mentioned in the first part have stated, one of the most interesting media characteristics of comics is the fact that they offer a great deal of freedom in the way the reader can move around the page, which is as much a narrative reading as a contemplation of the action unfolding in the space. The interest of some of the data collected in the experimental approaches could be to offer levers to better understand (and better teach) the way in which such and such a process, linked to such and such a genre, allows to exploit this double articulation of sequential images spread out in space.
- 7 Therefore, one should not expect from this study a systematic approach of comics reading based on the empirical verification of hypotheses formulated before the experimentation. On the contrary, it is an a posteriori interpretation of research data collected for other purposes, with the aim of providing a heuristic lever for a better

understanding of comics reading, in all its complexity. Instead of illustrating the logic presiding over the sequential articulation of narrative images within the page, this approach aims at diverting these data to illustrate the potential effects of some more rarely studied, but equally important, devices. It is thus a question of deepening the understanding of the great diversity of the narrative and graphic procedures mobilized by the authors of comics, on which depends a rather vast network of virtual pathways within the page. Finally, it is a question of remembering that the intelligibility of the graphic narrative may depend on the sequential articulation of its panels, but the richness of the aesthetic experience that results from it also depends on the other ways of navigating on the surface of the page, and the experimental approaches of reading should be able to serve to account for this aspect as well.

## Beyond the shadow of the Z: How we read comics

8 *The Shadow of the Z* is a comic book published in 1962 in which the heroes, Spirou and Fantasio, try to thwart the diabolical plans of Zorclub, a mad scientist who seeks to manipulate people. In the context of this study, the allusion to Franquin's work can be read as a metaphor inviting us to move beyond research that approaches the reading of comics solely from the conventional angle of a linear progression from panel to panel, often represented as a zigzagging path in the architecture of the page<sup>2</sup>.

9 Indeed, the most striking media singularity of printed comics seems to be the fact that it deploys the sequence of its iconotextual message (generally a narrative) in the space of its publication support. It follows that in order to decode the message, it is necessary to linearize the elements that make up the page to read its information in an order determined by the position of the panels in the page by different conventions of reading, which may vary from one culture to another (Cohn 2013).

10 If this linear reading is fundamental for the comics—which is often referred to as “sequential art” (Eisner 1985)—most of the researchers who have studied this form of expression have underlined the existence of another type of articulation of the images. It falls under what Pierre Fresnault-Deruelle calls the “tabularity” (1976) and which is based on the spatial organization of the page. The latter affirms thus:

In other words, although comic-strips and pages are often conceived and produced in a metonymic perspective (the part/the whole), it appears that we are in the presence of two specific practices (often neutralizing, in fact, their relevant traits in a common undifferentiated zone: the comic strip in general) which are at the same time complementary and antagonistic, as dialectically linked as the continuous and the discontinuous can be. The strip belongs to the temporal (the linear), the board, in principle, to the spatial (the tabular). (Fresnault-Deruelle 1976: 7.)

11 Following Fresnault-Deruelle, many other researchers have also emphasized the effects of what Benoît Peeters calls the “peri-field” (*péri-champ*)—namely this always visible space surrounding the panel which modifies its perception because of topographical constraints:

In comics, there is an absolutely specific space [...] that we could call the peri-field. It is formed by the other panels of the page, or of the double page; this space, being simultaneously different and adjacent, inevitably influences the perception of the panel seen by the reader. No glance can seize a panel as a solitary picture; in a more or less obvious way, the other panels are always already there. [...] As any particularity of a media, this data may reinforce or impair a project. Great authors

of comics are those who have coped with this specific constraint by organizing the double page according to what we may call topological preoccupations. (Peeters 2003: 21–22.)

- 12 As suggested also by Scott McCloud: “Unlike other media, in comics, the past is more than just memories for the audience and the future is more than just possibilities! Both past and future are real and visible and all around us! Wherever your eyes are focused that’s now. But at the same time your eyes take in the surrounding landscape of past and future.” (McCloud 1993, 104.) Groensteen explains this phenomenon by the visual nature of the medium, which facilitates an immediate apprehension of the content:

Comics are fundamentally a kind of literature that hides nothing, offered to a full possession, with nothing left aside: we discover it just by leafing through it, we navigate on its surface without obliterating what was seen before, and with keeping an eye on what is coming next. (Groensteen 2011: 82.)

- 13 The co-presence of images within the space of the graphic medium—which can be read or be contemplated as one looks at a painting—generates numerous effects that are worth noting, because they can be considered as formal and semiotic characteristics on which the media identity of comics is partly based. Understanding the language of graphic narratives thus requires taking into account these non-linear articulations, in the same way that understanding an Excel table requires articulating the information contained in the cells with the understanding of the place they occupy within a structure that hierarchizes the data and constructs plurivocal relations with adjacent cells but also with more or less distant cells. Following the work of Jean Ricardou, Thierry Groensteen (1999; 2016) points out the existence of a double articulation of panels, which he links to a restricted arthrology (for sequential articulation) and a general arthrology (for non-linear articulations). If we take into account these semiotic characteristics of the medium, it becomes clear that the non-sequential reading is not only a possibility—that we could qualify as a deviation from a normal reading pattern and link to experimental procedures—but one of the defining and most striking features of the “natural” reading of graphic narratives (Baroni 2020).
- 14 In addition to these considerations that complicate understanding the order of reading, research on what Kathryn Hume calls “narrative rhythm” has emerged recently (2005). From this point of view, the question of progression in graphic narratives no longer rests solely on the determination of a reading path, but also on the accelerations and slowdowns of this reading linked to different procedures. The question of rhythm depends closely on the characteristics of the medium, as comics bring into play specific problems related to the segmentation of the panels, their arrangement in the space of the page and their graphic content (Baetens 2022). This question of rhythm is particularly important for humorous comics, whose story leads to a comical punchline. Indeed, Benjamim Picado has recently highlighted the existence of discursive and graphic matrices that punctuate visual gags, so that it becomes possible to understand better the functioning of certain genres related to graphic humor, and more generally, of the “the elementary episodic structures of comic art” (Picado 2022: 104).
- 15 The aim of this study is not to question the interest of empirical research which aims at defining the conventional path on which the sequential reading of comics. We aim to widen this field of investigation by including narrative rhythm and non-linear paths, while associating them to different narrative genres, in this case to the one-page French-Belgian comic strip. Moreover, on the basis of such a corpus, it will be a

question of shedding light on the effects of prograde and retrograde readings patterns induced by visual gags.

## On some aspects concerning the reading of comics and the methodological problems that arise from it

- 16 As we have already mentioned, in the last few decades, the reading of comics has been the subject of numerous speculations aimed at understanding the mechanisms that lead to a non-linear reading of comics pages. Without aiming to be exhaustive, we can mention the hypothesis of a global seizure of the page which would precede the linear reading and influence its course. Antoine Roux mentioned this aspect in 1970:

The deciphering of a comic strip is not different in principle from the psychological hypothesis of global reading: the reader does not begin by analyzing the first image at the top of the page in order to move on to the second, then the second in order to move on to the third, and so on... At least not initially: he or she first perceives the page as a whole, a perception that is almost unconscious because it is extremely rapid (let's give it a try !), but which is sufficient to ensure that the reading is then involuntarily "directed". It is thus in a kind of "perceptive expectation" that, in a second time, the reading panel by panel proceeds. (Roux 1970: 29.)

- 17 Will Eisner formulates more or less the same hypothesis a few years later, even if it is rather to condemn the tendency of the readers to deviate from the prescribed order to go and look at the last panel of the page, which tends to ruin certain effects (in particular surprise and suspense):

The (western culture) reader is trained to read each page independently from left to right, top to bottom. Panel arrangements on the page assume this. This, ideally, is the normal flow of the reader's eye. In practice, however, this discipline is not absolute. The viewer will often glance at the last panel first. Nevertheless, the reader finally must return to the conventional pattern. (Eisner 1985: 41.)

- 18 These assumptions about the "global attention" have been more or less confirmed by empirical studies (see in particular Mikkonen and Lautenbacher 2019). This research also tends to show how the complexity of some page layouts can reinforce this tendency towards a non-linear progression, while more conventional layouts encourage sequential reading instead. It is thus obvious that it is very difficult (and sometimes impossible) to read sequentially most of the pages of Chris Ware's graphic novels, whereas a Tintin album is better suited to a relatively classical progression.

- 19 A second highly influential hypothesis is that formulated by Groensteen (1999), who approaches the non-linear articulations between panels from the "iconic braiding" perspective. He states that reiteration of a visual element can create this effect: "When the instance of braiding is a matter of repetition of an image or a motif, it can technically be described as a case of self-quotation" (2016: 89). The repetition of similar images (possibly reinforced by the isomorphism of the panels) can thus create correspondences between panels that are distant from each other, producing cataphoric or anaphoric effects that function as visual rhymes. However, Groensteen insists on the fact that such effects are not found on all comics pages and, even when they are present, their perception by a reader is far from being systematic:

Some authors make the decision, a perfectly legitimate one, to restrict themselves to a classic unfolding of the narrative, based on linear linking structures, of a causal, deductive nature, where the meaning of each panel is beholden only to the

previous ones. Others choose to exploit the capacity peculiar to comics for setting up relations between panels in accordance with the operation that I proposed, in 1999, to call *tressage* [braiding]. [...] [B]raiding effects [...] are not always (far from it) perceived as such, nor correctly interpreted. [...] I hope that I have made myself clear: I do not fetishise braiding, nor do I set it up as the criterion of the quality or artistic success of a comic. (Groensteen 2016: 89.)

- 20 If we follow this principle, we must therefore admit that non-linear reading paths cannot always be approached empirically based on a predictable and statistically homogeneous progression, but rather based on local possibilities of divergence from a conventional path. This probability will increase locally in relation to certain factors whose contours we can hope to identify. Therefore, empirical definitions of these divergences should be based on observation of atypical but interpretable pathways as they relate to predictable bifurcation points. Formally speaking, these points function as an invitation to deviate from the conventional path, which are often neglected by readers in a hurry to progress in the narrative. However, the value of these occasional deviations should not be overlooked. In the field of education, the study of comics often leads to an awareness of the specificity of this medium, thereby enabling learning to wander around the page, to contemplate it like a painting. As Jesse Cohn states:

At times, while reading a graphic novel, we can lose sight of the fact that we are looking a page. Indeed, most of our students, accustomed to thinking of comics as easy reading, run their eyes quite rapidly over the pages that are usually designed not to interrupt this ease; they see characters acting in time, not a design extended over space. (Cohn 2009: 44–45.)

- 21 Elizabeth Rosen also advocates drawing students' attention to the specifics of reading comics, which requires a deviation from the linear progression:

Comics challenge most of the ways we learned to read: left to right, top to bottom, linearly, and progressively. They require a different sort of reading, one that many students assume they already do, simply because they have read comics before and "understood" them. (Rosen 2019: 58.)

- 22 These teachers thus advocate an education that encourages deviations from linear progression, using different types of mediation, such as layout typologies, which act as revelators of the tabular dimension of the page and its effects on reading (Cohn 2009; Baroni 2022).

- 23 The rhythm of reading appears just as complex to predict, insofar as comics are a mode of expression that Philippe Marion describes as "heterochronous", as opposed, for example, to cinema or theater, which are "homochromous" (1997: 82). In other words, the time of fixation on each frame is freely determined by the reader, although it is obviously possible to identify a series of potential factors that may speed up or slow down the reading. There is little doubt that silent panels are generally read more quickly than panels with text (speech bubbles or recitatives) or that complex images induce a longer contemplation than less detailed images. Roux also considers that the global seizure of the page, which precedes its reading, influences the rhythm:

With the comic book, it is the spectator himself who sets the pace at which he/she will decipher the story: his/her rhythm can therefore vary with each reader. For each reader, the differences in the time of perception of certain images, particularly noticed or on the contrary neglected, will be a function of the global intuition unconsciously registered at the beginning. (1970: 30.)

- 24 We will see that this last hypothesis is particularly interesting, as it suggests that it is not only the content of the panels that influences the speed of reading, but also the

relationships between the panels when they are seized at the scale of the page. The case of the sequences that we will qualify as “chronophotographic” will thus constitute an exemplary case of the existence of fundamental links between the global quasi-perception of the page and the speed of reading panel by panel.

## Two graphic and narrative configurations affecting the order and speed of comics reading

- 25 As mentioned earlier, our empirical study focus on two graphic and narrative configurations related to the genre of the humorous French-Belgian comics, whose narrative unity corresponds to the one-page gag, a format that has been very commercially successful since the 1960s, as shown by the series *Cubitus*, *Léonard*, *Les Schtroumpfs*, *Gaston Lagaffe* or *Titeuf*. Among the recurrent processes in this genre of comics, we focus on two phenomena that can be associated with an inflection of the reading path:
1. the mysterious panel preceding a surprising twist that encourages a retrograde reading;
  2. the burlesque sequence of panels which is based on a decomposition of a movement or an action, which we will call a “chronophotographic” sequence.
- 26 The first case is simple to describe and is based on a well-known narrative pattern: a character wants to perform a difficult action and ends up finding an original solution, the nature of which is only revealed in the last panel, so that this unexpected (and usually absurd) resolution functions as a comic punchline. We can then hypothesize that the graphic concealment of the solution is likely to induce a retrograde reading aiming at understanding the temporarily hidden meaning of certain actions that led to the resolution.
- 27 The second case refers to slapstick comedy, a genre that was very popular in silent cinema, from Louis Lumière’s *L’Arroseur arrosé* to the comedies of Buster Keaton and Charlie Chaplin. This genre also had a great fortune in the comic strip. In the burlesque sequence, a character is engaged in a perilous action that challenges his or her physical abilities, including balance or responsiveness, while threatening a potentially painful or damaging resolution. The comic effect is thus based on the expectation of a potentially catastrophic outcome and on the deployment of a physical performance illustrating this logic of the “mechanical encrusted on the living” in which Bergson (2012) located the origin of laughter.
- 28 The success of this genre in comics can be partly explained by its close relationship with a certain mode of representation of action inspired by the devices for decomposing movement that appeared at the end of the 19th century which were also at the origin of cinema. As Laurent Guido explains, “the representation of human movement in comics has benefited to a large extent from the influence of chronophotographic analysis techniques”, developed in particular in the United States by Eadweard Muybridge and in France by Etienne-Jules Marey and Georges Demeny (cf. Guido 2007: 95; see also McCloud 1993: 108–109; Boillat *et al.* 2016). We can therefore speak of a “chronophotographic” sequence in comics when the graphic narrative includes the decomposition of an action by means of a regular temporal division that



suggests a continuity between the squares, this technique generally being used for a burlesque effect, as in this strip by Winsor McCay:



Illustration 1: Winsor McCay, *Little Sammy Sneeze*, September 24, 1905.  
Image free of rights.

- 29 Formally speaking, the chronophotographic sequence is composed of a succession of panels of similar size and format that present different phases of a single action, according to a division that McCloud would describe as “moment-by-moment” (McCloud 1993: 70). To reinforce the continuity of the action, the angle and framing remain fixed, and because the emphasis is on physical movement, the panels are usually devoid of text. When a sequence of this type is integrated into a page, it tends to create a strong figural solidarity between the panels that make it up, and we can hypothesize that the panels are read more quickly, not only because they are silent, but also because each panel appears to be subordinated to the unfolding of a single action. Finally, it can be suggested that such groupings, which are graphically salient in the page and whose narrative meaning appears immediately accessible, invite the reader to an anticipated reading.
- 30 To better understand the potential effect of these two devices on comic book reading, we will now rely on the results of a survey using eye-tracking technology. As explained in the introduction, our objective being essentially heuristic and exploratory, we will spare an in-depth explanation of this approach and of the original context of the data collection in order to concentrate on the interpretation of some interesting results, insofar as they shed light on the effect of the narrative and graphic configurations we have just presented.

## Experimental approach, methodology and corpus

- 31 Since humans can only see a small part of their visual field in high resolution, they have developed attentional mechanisms to identify the most significant parts of a scene. Thus, the central region of the visual field moves to observe the interesting parts

in high resolution, and the eye movements—that takes the form of small jumps between different fixation points—are called saccades. Eye-tracking is a technology that has been developed to better understand these attentional mechanisms by recording data on the location and movement of the gaze over time. By recording and visualizing gaze saccades, this technology opens a window on the cognitive perception process of humans. Since the pioneering work of Buswell (1935) and Yarbus (1967), visual attention has been the subject of numerous experiments that also take into account the nature of the stimuli: natural images, reproduced images, videos, newspapers, and comics.

- 32 Mikkonen and Lautenbacher (2019), for example, studied the interaction between the page layout and narrative content of comics. In particular, they observed longer saccades at the beginning and end of reading, with readers' overall attention aimed at checking the importance of visual and narrative information on the pages and anticipating the meaning of the reading. They also found that at the end of reading, readers may try to make new connections to ensure that they have not missed anything important. Foulsham, Wybrow, and Cohn (2016), meanwhile, examined the effect of a narrative sequence on visual attention by studying fixation distributions. They found that when panels are shuffled, people either make more fixations or longer fixations to understand a panel. Therefore, attention to sequences of images is different from attention to individual images. This indicates that the narrative order affects where we look, even if the visual content is the same.
- 33 Carroll Young and Guertin (1992) asked participants to evaluate the humorous content of single-picture comics. They observed that subjects first glanced at the visual content, then read the text and finally inspected the visual content in more detail. We therefore find that these results support Antoine Roux's "global grasping" hypothesis, according to which readers glance at the visual content before reading the page frame by frame.
- 34 In order to deepen our understanding of the visual and narrative mechanisms we mentioned in the previous section, the data we are going to exploit are drawn from an experiment linked to the project "Reconfiguring Comics in our Digital Era" financed by the Swiss National Science Foundation (SNF project no. 180359). These data originally aimed at defining a reading mode inherent to a certain genre of comics (the "classic" Franco-Belgian comic strip) and to a certain type of medium (the 48-page color hardback album), in order to reflect, in a second step, on the transformations induced by the digitization of these narratives and by their reading on screen. Without going into this specific problem of the reconfiguration of digitized comics, which we have addressed elsewhere (Baroni, Kovaliv, and Stucky 2021), we will now briefly describe these data, which will serve us, within the framework of this article, to explore certain specificities of the reading of humoristic comics.
- 35 As part of the data collection, twenty-three participants between the ages of 19 and 60 were asked to read thirty-one-page comics at their own pace on a computer screen. A total of 668 pages of gaze data were thus recorded with spatial coordinates and time-stamp information. We extracted standard eye-tracking measures such as dwell time, number of fixations, time to first fixation, and number of revisits for each area of interest.
- 36 Our dataset consists of stories published in French from six authors representative of the Franco-Belgian production of the years 1960–1980. To balance the characteristics of each author, we have selected five pages for each of them, which can be considered as

characteristic of their style. All stories are complete: they start and end on the same page, matching the overall narrative sequence with the space of the board shown on the screen. This format avoids the problems of understanding the content that might result from choosing excerpts from longer stories. The one-page gag also appears particularly apt to highlight the interactions between the form of the story and the way it occupies the space of the publication medium.

- 37 The choice of authors (Peyo, Clarke and Gibson, Dupa, Midam, Franquin, Roba and Rosy) and the selection of pages is finally representative of a kind of humorous story which has remained quite homogeneous in its form and which had its moment of glory during the time when the format of the Franco-Belgian album was imposed as a standard of publication. We can consider that this type of funny story constitutes, with the adventure story spread over 48 or 64 pages, one of the two dominant genres of the “classic” Franco-Belgian production, i.e. a production adopting a popular, standardized and rather stable format in its form and content, which preceded the diversification of the genres and formats which occurred from the end of the 1970s and which led to the appearance of graphic novels. The standardized nature of the production greatly facilitates comparisons and statistical approaches.

## Interpretation of the results

### Effect of mystery panels and deferred resolutions in the reading process

- 38 The first striking result we observed concerns one of the pages in our corpus, whose configuration appeared particularly apt to illustrate a retrospective reading effect induced by the particular configuration of this humorous story. This page is taken from the Cubitus series and features the eponymous hero building a paper boat using an billboard promoting a cruise. The story is almost entirely silent, with the exception of a few onomatopoeia and textual elements integrated into the world of the story (in this case in the billboard and in the banner of a boat rental company).
- 39 If we go back to the overall narrative structure, which is fairly representative of a certain type of funny story, we see that the first three panels consist of creating a desire that is apparently impossible to achieve, the next panel has the protagonist conceiving and carrying out a plan whose hidden nature arouses curiosity until the final panel. Finally, the last strip reveals the seemingly absurd and surprising way in which the hero has achieved his goal. In this case, the element that aroused the desire appears in retrospect as being at the same time the means of the desire’s accomplishment.

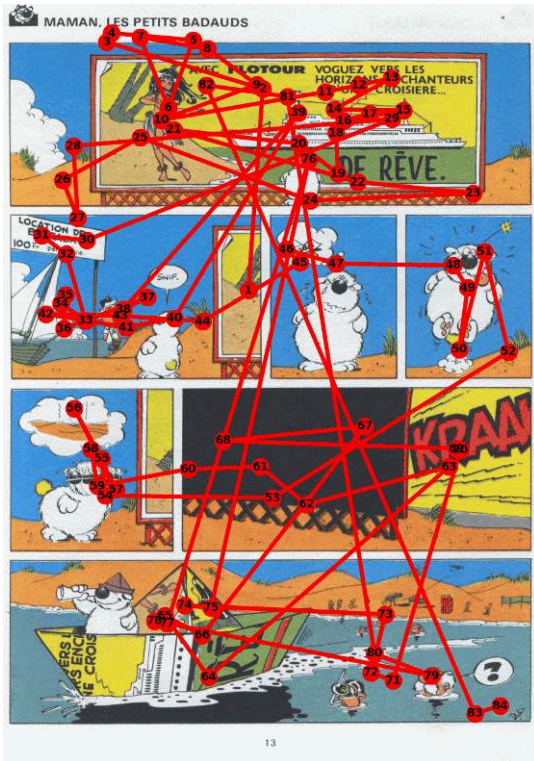


Illustration 2: Gaze path of a representative participant (Dupa, *Un oscar pour Cubitus*, Le Lombard, 1978, p. 13).

Dupa © Le Lombard (Dargaud-Lombard s.a.), 2022.

- 40 The data we have collected show a very consistent reading path: 21 times out of 22, we observe a return to the last panel, to look again at different places in the story whose meaning did not immediately appear (ill. 2). In particular, there is a very frequent return to panel 6 (18 times out of 22), which is one of the most mysterious panels on a first reading while being particularly poor in information. As the heatmap shows (ill. 3), while it is often barely skimmed the first time, this panel is finally, with the first two panels that include textual elements, one of the most interesting areas of the page. It seems, therefore, that readers have a strong tendency in this story to return to places first perceived as mysterious, in order to gather visual clues whose meaning only appears in a retroactive manner. There is also a significant number of returns to the first panel, with the visual patterns of the poster being found on the hull of the boat and explaining its origin. In this case, a strong braiding effect (in Groensteen's sense) is created between the two images: not only are the two panels the only ones to feature a ship, with the second containing fragments of the image from the first, but they are located hierarchically at the beginning and end of the sequence, the symmetry being reinforced by the fact that they are of identical format, occupying an entire strip that distinguishes them from the others.

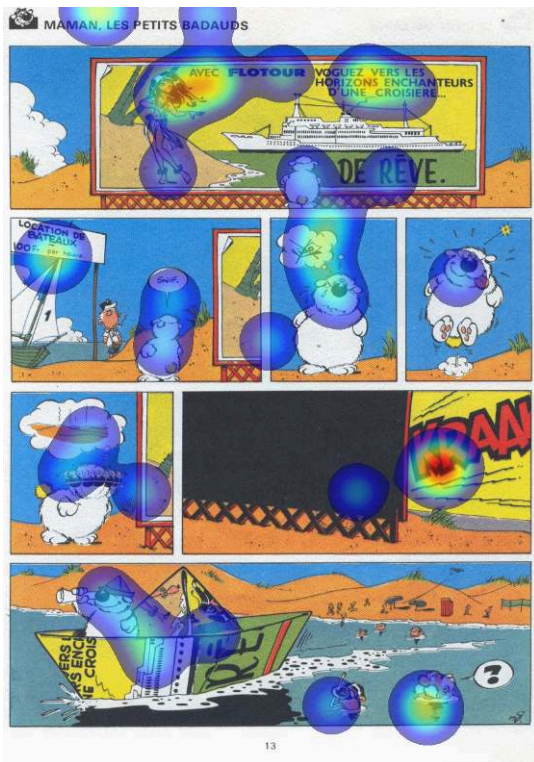


Illustration 3: Heatmap of the same representative participant (Dupa, *Un oscar pour Cubitus*, Le Lombard, 1978, p. 13).

© Dupa, Le Lombard, Bruxelles.

- 41 Through these results, we can see that this humorous story, whose underlying structure appears to be fairly widespread, gives a specific role to the last panel. Not only does it close the story, but it also functions as a surprising punchline inviting us to reread an action whose outcome was difficult to predict and seems a priori absurd. In this, this genre is at the antipodes of the adventure story, whose publication in weekly magazine, which generally preceded the publication in album, often conferred a role of cliffhanger to the last panel of the page, its function being to direct the attention towards the continuation of the story rather than towards its previous course. This function is defined by Roux as a rhythm based on a “vignette-suspense” (literally a “suspense-panel”):

The weekly comics present adventures usually illustrated on two pages of the periodical (which usually also publishes complete stories in four to eight pages), that is to say some 15 to 20 vignettes. The cartoonist’s trick is to end the series with a “suspense-vignette”. By the same token, there is an imposed rhythm, which could be criticized for distorting the plot. But is this not the hackneyed problem of “rules”, which do not prevent an artist from making a valid work? (Roux 1970: 47.)

- 42 One could affirm that many humorous stories in one page seem on the contrary to be based on the arrangement of several “vignette-curiosity” which precede a “vignette-surprise-conclusive”, which sometimes invites to reread the page and thus reinforces the non-linear character of the graphic narrative<sup>3</sup>.

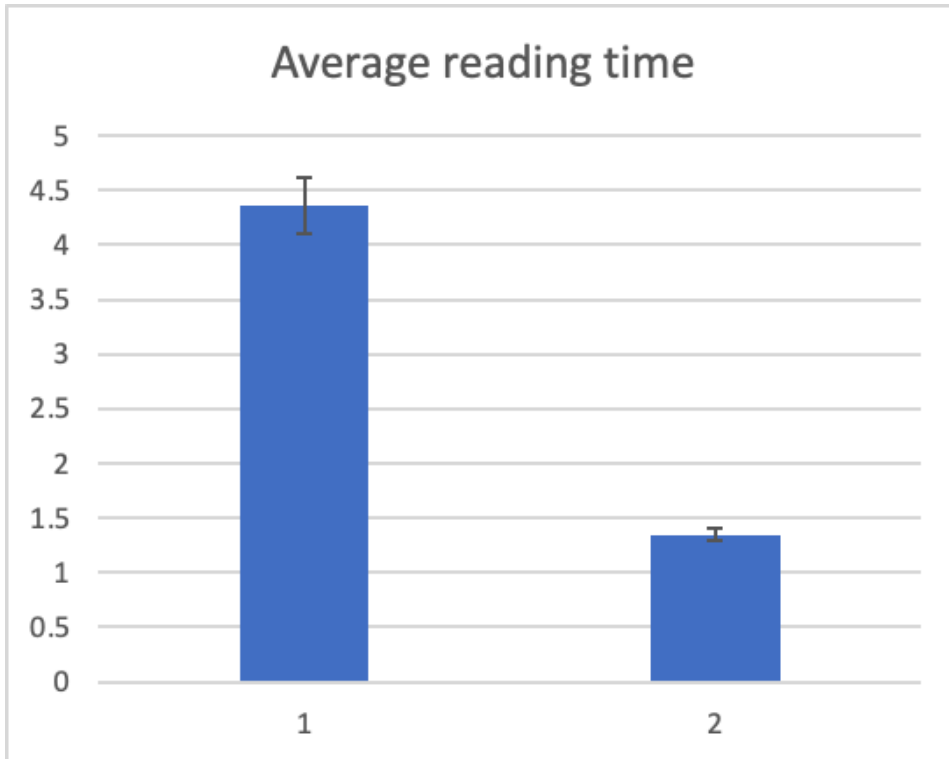
## The effect of chronophotographic sequences on reading

- 43 Given the supposed correlation between “chronophotographic” effects and the absence of text in this type of sequence, we cross-reference in the following table the number of panels in our corpus with or without text and the number of panels involved or not in chronophotographic type sequences:

|                                   | With text | Without text | Total |
|-----------------------------------|-----------|--------------|-------|
| With chronophotographic effect    | 6         | 70           | 76    |
| Without chronophotographic effect | 114       | 57           | 171   |
| Total                             | 120       | 127          | 247   |

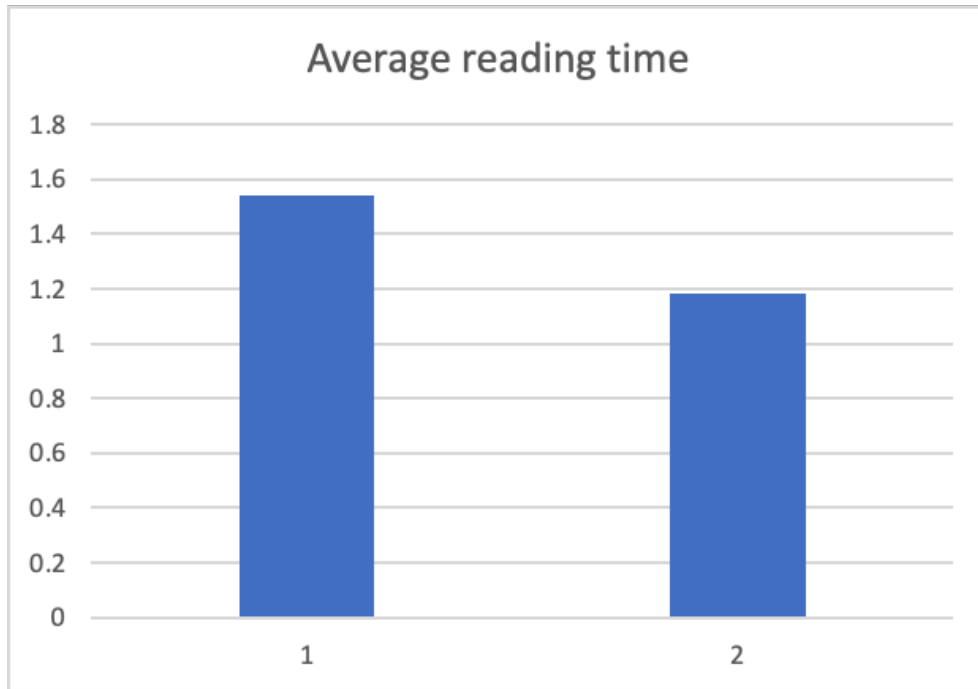
Table 1: Correlation between chronophotographic sequences and silent boxes.

- 44 We thus see a very strong correlation between the absence of text in the panel and its insertion in a chronophotographic sequence: on the one hand, 92% (70/76) of the panels inserted in a chronophotographic sequence are devoid of text, on the other hand, when a panel is silent, it belongs in 55% of the cases to a sequence of this type (70/127). It should also be noted that only 2 of the 76 boxes associated with chronophotographic sequences include a textual element of more than one word (the single word being generally an onomatopoeia).
- 45 The second type of data looks at the total time spent on each panel, differentiating between panels with text (column 1) and panels without text (column 2). Predictably, the analysis shows that people read the panels with text more slowly than the boxes without text.



Graph 1: vertical axis: number of seconds per panel; column 1= average reading time for all panels in the corpus; column 2= average reading time for panels in the corpus without text.

- 46 Since the presence of text prolongs the time spent on a panel, we focused only on panels without text to analyze the effect of chronophotographic sequences on the reading rhythm. The results show that the panels with chronophotographic effect and without text are read significantly faster than the panels without chronophotographic effect and without text.



Graph 2: vertical axis: number of seconds per panel; column 1= average reading time for silent panels without chronophotographic effect; column 2= average reading time for silent panels with chronophotographic effect.

- 47 This result underlines the fact that the time spent on each panel does not depend only on its content but also on the perception of the relation that can be established between this content and that of the adjacent panels, which confirms the importance suggested by Roux of “the global intuition unconsciously registered at the beginning” (1970: 30) on the rhythm of reading, even when this rhythm is particularly rapid. In other words, the effect of acceleration induced by the chronophotographic sequences is only explicable insofar as one includes to the perception of the panel as AOI in a linear progression, a peripheral or global quasi-perception which allows to link this zone to a hierarchically superior space corresponding to the chronophotographic sequence seized in its totality. Moreover, we can assume on the basis of these results that the perception of this enlarged zone is facilitated by braiding effects that distinguish it at first glance from the other zones of the page. As we have already suggested, this braiding effect is based in particular on the recurrence of visual motifs (the same character is shown from the same angle with the same framing) and on the isomorphism of the panels characteristic of these sequences.
- 48 If the influence of the photographic sequences on the acceleration of the rhythm of reading could be verified by our survey, on the other hand, we did not observe significant differences at the level of the order of reading. In other words, the chronophotographic sequences do not seem to induce a back-and-forth movement within this sequence which would make it more autonomous from the other elements of the narrative, like a flip-book whose unfolding would be replayed several times in order to enjoy the resulting movement effect. On the other hand, in isolated cases, it has been possible to observe readings whose atypical trajectory seems to have been directly inflected by such a sequence. This is the case in particular of the following reading (ill. 4), during which the subject seems to have been tempted to begin by



actualizing the chronophotographic sequence before beginning his zigzag reading which later leads to understanding its humorous meaning.

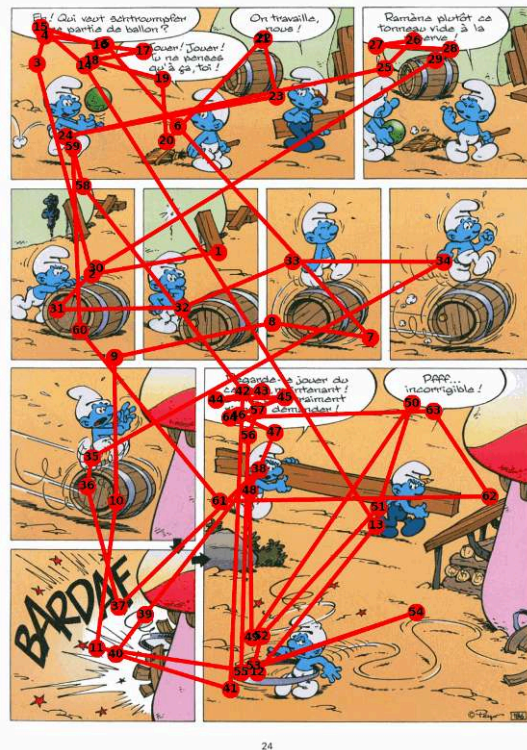


Illustration 4: Example of prograde reading correlated to a chronophotographic sequence (Peyo, *Schtroumpferies 5*, Le Lombard, 1996, p. 24).

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- 49 Here the chronophotographic sequence is particularly salient, due to a very strong braiding effect between the four panels forming the second strip of the page, to which we can associate in a more peripheral way panels 7 and 8, which function as a brutal resolution of the action. This power of attraction of the burlesque sequence, which is not unrelated to the aesthetics of silent movies, underlines the invitation to a divergent reading induced by this type of mechanics. This reading also verifies this tendency evoked by Eisner, which consists in going to linger in the last panel, whose content is partly revealed, before really reading the story.
- 50 However, rather than lamenting the fact that “there is absolutely no way in which the artist can prevent the reading of the last panel before the first” (Eisner 1984: 40), we can see that Peyo manages to keep his story interesting by playing on a double-slack resolution, which explains why his layout encourages the anticipated vision of the result of the burlesque sequence rather than trying to hide it. Indeed, the large final panel appears as an invitation to anticipate its visual content, just as the chronophotographic sequence allows us to grasp very quickly the process that led to this situation. The comic resolution then consists in showing that Lazy Smurf is here a victim not of his nature, as his fellow creatures believe, but of the fact that he tried to act against it by helping (in his own way) to transport a barrel. Where the reader has understood from the start that the content of the last panel shows the result of an accident, the other characters in the story misinterpret the situation, with Lazy Smurf’s behavior being perceived as an act of idleness, since they mistakenly think that he is playing the hula hoop. Here, the humor lies in the discrepancy between a behavior and

the way it is interpreted by others, illustrating a moral injustice or an invitation not to try to act against one's nature.

## Conclusion

- 51 In this article, even if we have only scratched the surface of the phenomenon, we wanted to insist on the importance, for experimental research on the reading of comics, of the tabular dimension of the page, which influences not only the potential order of the reading, but also its rhythm. Alongside restricted arthrology, which forms the basis of sequential reading, it is thus urgent to give at least an equivalent place to the empirical study of generalized arthrology, which expresses the non-linear relationships that are established between different places on the page or in the album and which also influences the reading experience, in all the diversity of forms that it can take. As we recalled in the introductory parts, reducing the reading of comics to a conventional zigzag progression risks missing not only what makes this medium original in the contemporary media landscape, but also what constitutes its greatest narrative and aesthetic richness.
- 52 It is probably this media specificity which explains the resistance of the European comic book to its digital transposition. As we have shown elsewhere (cf. Baroni, Kovaliv, and Stucky 2021), the Franco-Belgian album is indeed very poorly suited to reading on screen, because the variable format of digital interfaces largely ruins the aesthetic pleasure that readers derive from their journey through the pages. The reading in slide show or in scrolling, which reconfigures the pages in a kind of a unique "infinite canvas" (cf. McCloud 2000: 220–229) does not thus constitute a simple help to a reading adapted to the constraints of a reduced interface<sup>4</sup>. Although it avoids the discomfort of the changes of scale, the zooming operations, and the multidirectional jumps between panels, strips and pages, the reading of a Franco-Belgian album reconfigured in the format of the infinite canvas inevitably leads to an aesthetic impoverishment, since it erases the effects resulting from the tabular organization of the page.
- 53 Even though they seem to encourage the most linear and rapid reading, the case of chronophotographic sequences appears in reality emblematic of this phenomenon of media resistance to digital transposition. By crossing the narrative logic of burlesque cinema with the aesthetics of the spatial decomposition of movement inspired by the chronophotographic experiments of the 19th century, the European comic strip has created an original narrative form which has known a great cultural fortune until nowadays, and whose interest would be ruined in the case of a slide show reading, which would make it look like an impoverished cartoon or a flip-book.
- 54 The difficulty would probably be smaller in the case of a humorous story adopting a shorter format of three or four panels arranged on a single strip, like the comic-strips published in American newspapers. Further research could thus attempt to compare chronophotographic sequences published in albums with their reconfiguration in a slide show, or with sequences of the same type, but belonging to the comic-strip genre. The fundamental link between the rhythm of reading and its publication medium should thus be investigated in greater depth by adopting experimental procedures, in the same way as the factor of narrative genre, which we have tried to shed light on in this study.

- 55 Moreover, our analysis also invites us to broaden the use of eye-tracking technology by renewing its epistemological and methodological frameworks, because it seems to us that this empirical approach is far from having provided all the answers that one could expect for a better understanding of comic book reading. In order to broaden the field of investigation, it would thus be appropriate to think about the type of question one is asking and the type of data one wishes to interpret in order to answer it.
- 56 While most eye-tracking studies generally aim, in a quantitative logic, to identify the principles underlying a “normal” reading of the comic strip, the consistency of which is statistically supported by drawing an average path and by discarding alternative paths that appear as informational noise, it would be a question, on the contrary, of including qualitative approaches that would look at results that are a priori surprising or marginal, that we tend too quickly to judge as not being significant. As we have shown with the analysis of the atypical reading of a page from the Smurfs, it is on the contrary possible to shed light with this kind of data on many aspects relevant to the understanding of the reading of comics. On this point, the quantitative approach should rather underline that such deviations are statistically much more frequent than in the reading of only verbal texts or of comic strips in slideshow, and that this freedom is precisely one of the essential aspects of a reading a priori underdetermined, but nevertheless articulated to iconotextual mechanisms of a great complexity.
- 57 In this case, rather than discarding apparently deviant readings, it would be more a matter of trying to interpret their underlying mechanisms, by seeking to link an apparently erratic course with places of bifurcation integrated into the narrative organization of the comics page. Of course, these points of divergence are only actualized by a few readers, but if they respond to this invitation to wander around the page, it is probably because they are particularly sensitive to the semiotic specificities of the medium, and not because they are incompetent. Wandering does not generally threaten the understanding of the comics content, but it does deepen its interpretation, and what was once considered an abnormality may well become a path to follow.
- 58 Such a methodology would not only refine the empirical understanding of the mechanisms that preside over the generalized arthrology of comics, but it could offer levers for reading didactics. Indeed, such observations could serve, along with layout typologies, as a mediation for teaching the tabular dimension of reading (Baroni 2021), for example by asking students to try to explain a seemingly surprising path by linking it to hinges in the panel, to formal elements that induce a non-linear organization of the narrative. As many recent studies have shown, if comics are a privileged object for developing skills in the field of multimodal media literacy (Lebrun, Lacelle, and Boutin 2012; Schaer 2021), it is precisely because, unlike a traditional verbal narrative, graphic narratives offer a much less marked out or predictable navigation between text and image, thus accentuating the interactive character of an object that is offered as much to reading as to contemplating its meaning.

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## NOTES

1. This reflection was developed within the framework of the Sinergia project “Reconfiguring Comics in our Digital Era”, funded by the Swiss National Science Foundation (SNSF: 180359).
2. With regard to the description of the constituent elements of the language of comics, we refer in this article to the bilingual terminology established by Kovaliv and Stucky (2019).
3. On the difference between suspense, curiosity and surprise, and on the dynamics of the plot in the adventure story in comics, see Baroni (2007).

4. On the notions of board and interface, see Stucky (2021).

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## ABSTRACTS

The aim of this study is to broaden the field of investigation of empirical research on the reading of comics by including aspects related to narrative rhythm and non-linear paths, while associating them with a narrative genre, in this case, the Franco-Belgian humorous comic strip. On the basis of this corpus, on one hand we are interested in the retrograde reading operations induced by visual gags in one page, and on the other hand, we investigate the impact of sequences that we call “chronophotographic”, the latter having received little attention until our study.

L'objectif de cette étude consiste à élargir de champ d'investigation des recherches empiriques portant sur la lecture des bandes dessinées en incluant des aspects liés au rythme narratif et aux cheminements non-linéaires, tout en les associant à un genre narratif spécifique, en l'occurrence la bande dessinée humoristique franco-belge. Sur la base de ce corpus, on s'intéressera d'une part aux opérations de lectures rétrogrades induites par les gags visuels en une page, d'autre part, on se penchera sur les effets de séquences que nous qualifierons de « chronophotographiques », ces dernières n'ayant, jusqu'à ce jour, reçu que peu d'attention.

## INDEX

**Mots-clés:** lecture, bande dessinée, eye-tracking, chronophotographie, tressage

**Keywords:** reading, comics, eye-tracking, chronophotography, braiding

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