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Scrolling into the Newsroom

A vocabulary for scrollytelling techniques in visual online articles

Keywords: scrollytelling, online journalism, visual storytelling, data visualization, design research, infographics, information design, narrative visualization

In recent years, scrollytelling—a method to animate content as a reader scrolls through an article—has become an integral part of online visual storytelling. Despite its popularity, few studies have examined the variety of existing scrollytelling techniques. In addition, scrollytelling is still costly to produce. This study aims to generate a scrollytelling vocabulary for newsrooms and creative agencies. By analysing 50 examples, we have identified granular characteristics of scrollytelling elements, or ‘scrollers’, and grouped them into five standard techniques: graphic sequences, animated transitions, panning and zooming, scrolling through movies, and showing and auto-playing animated content. The study provides information designers, developers, and visual journalists with a vocabulary to experiment with different scrollytelling techniques and implement scrollers faster and more easily.

1. Background

Scrollytelling refers to a storytelling format in which visual and textual elements appear or change as the reader scrolls through an online article. When readers scroll, something other than the conventional movement of a document through the viewport happens. Although scrollytelling has become prevalent in online journalism over the last decade (Wolf & Godulla, 2016), it has received little attention in information design literature. A definition with such fuzzy edges might be one reason for this. Scrollytelling being ‘something else’ rather than the default also makes it costly to produce (Seyser et al., 2018; Lu et al., 2021; Sultanum et al., 2021). Apart from the regular challenges faced when researching a story, analysing data, and producing text and visuals, interaction designers need to define the scrolling behaviour, and developers have to create custom implementations (Goldenberg, 2017). Early seminal pieces such as “Snowfall” from the New York Times¹ took months and a dozen people to produce it (Dowling & Vogan, 2014; Greenfield, 2012). Scrollytelling has, therefore, often been associated with long-form journalism² (Dowling & Vogan, 2014; Wolf & Godulla, 2016). Scrollytelling is lauded for its ability to bring together text and visual elements into a vertical reading

experience uniquely suited for a small screen (Stolper et al., 2018). However, without a body of knowledge on viable design patterns, scrollytelling has also been criticized for creating bad user experiences, such as ‘scrolljacking’ (Bostock, 2014), and confusing interaction design implementations (Kosara, 2016).

Some attempts have been made to identify and categorise common patterns among scrollytelling elements, or ‘scrollers’. Accordingly, scrollers have been grouped based on their different attributes: type of visual element (Seyser et al., 2018); chart type, type of transition and layout (Sultanum et al., 2021); what readers control by scrolling (Vallandingham, 2015); or the importance of the visual element compared to text (Seyser et al., 2018; Lu et al., 2021). Some authors have built tools that implement a specific configuration of these attributes. Lu et al. found that unit visualizations with animated transitions between states were a common type of scrollytelling (2021), and they narrowed their analysis to examples of this type, extracting design requirements to build a tool. Sultanum et al. (2021) followed a similar approach and found that sequences of charts that are accompanied by text are a prevalent form of scrollytelling. Their analysis of examples defined the design requirements for a scrollytelling tool. In this study, we follow a similar approach to Lu et al.’s and Sultanum et al.’s. However, instead of focusing on a single scrollytelling pattern, we examine atomic characteristics of a variety of scrollers with the aim of creating a library of scrollytelling techniques.

2. The problem

At the Swiss daily *Neue Zürcher Zeitung*, scrollytelling techniques have been used in some highly customized articles. The scrollytelling elements or ‘scrollers’ usually took weeks to implement and called for intense

collaborations between programmers, designers, and writers. Lacking an understanding of the recurring modular elements of scrollytelling, we did not evaluate or document design decisions. Therefore, despite the high volume of resources, we failed to reuse code and design patterns in later projects. The lack of a shared language also meant that misunderstandings between designers, developers, and writers were common. The misunderstandings concerned both the general use of scrollytelling and differing interpretations of prototype designs, especially with regard to transitions and animations.

At the same time, all our articles in which scrollers had been used were highly successful. They drew a large readership, boosted reading times, and received positive feedback. Therefore, the question arose: How could we produce articles with high-quality scrollers more frequently? In order to tackle the communication and documentation issues described above, we needed resources and tools that would allow us to: (i) discuss scrollytelling projects across the newsroom using a shared vocabulary; (ii) produce scrollers faster and with fewer resources; and (iii) explore different types of scrollytelling.

Challenges were mainly characterized by the tension between the focus on rapid news production and the space and time needed for thorough conceptual work. Avoiding quick and easy software solutions and instead driving a collaborative knowledge-building process was at the time unfamiliar to many journalists. The journalistic context also meant that our solutions would have to be content-agnostic and accommodate a large variety of topics and visualizations. Finally, the proposal needed to work with our internal charting toolbox³ and deal with the constraints of our content management system. These integration issues were also the reason why commercial tools—often built for standalone articles—were not compatible with our use case.⁴

3. Methodology

To address our lack of a shared language for scrollytelling projects, we focused on finding recurring patterns that could inform future designs. Therefore, we conducted a content analysis on a corpus of 50 online stories (see *Annex 1*).

The corpus consisted of articles that had been collected by the visual department at *Neue Zürcher Zeitung* over the last few years and had been shared in a Slack channel called #inspiration. Most examples were from organizations with large graphics teams such as *The New York Times* and *The Washington Post*, but there were also a few from outlets such as the *South China Morning Post*, *El País* or smaller creative agencies. The only criterion was that there should be at least one visual element that reacted to scrolling in a non-standard way. Some articles contained multiple such ‘scrollers’. The articles also used a wide array of media types, ranging from illustration and data visualization to photography and video.

After establishing the collection, we analysed each example. Our leading question was: “How would I describe the example to a developer so that they could recreate it?” Each author defined key characteristics for an average of 15 examples. We then combined those three sets of characteristics into one, creating a unified collection of eight keys and corresponding values. We called these key-value pairs **‘scrollly-atoms’**. In a second analysis round, we split the corpus among the authors and characterized each scroller in our examples according to the scrollly-atoms. These atoms are described below—keys are set in bold and values are italicized.

Layout of the visual on desktop: How much of the browser’s viewport is covered by the visual element. The viewport can be covered *fully* or *partially* by the visual; or the visual can be embedded in the text (*inline*).

Scroll-behaviour of the visual: If and how the visual element moves across the viewport when the reader scrolls. The visual can move *vertically*, *horizontally*, *in any direction*, or remain *fixed*.

Scroll-behaviour of the text: How the text block (usually a paragraph) moves when the reader scrolls. The text can move *vertically*, *horizontally*, *in any direction*, or remain *fixed*.

Visual-text-relation: How many text blocks there are per visual element. There can be one text per visual (*one-to-one*), multiple texts per visual (*one-to-many*), multiple visuals per text (*many-to-one*), or *no text*.

Type of visual element: The visual element can be *static* (an image, chart or illustration) or *moving* (an animated or live-action movie).

Transition type: If and how the visual element changes on scroll. The visual can *transform* into or be replaced by the next visual (*swap*); or parts of the visual can change so that they appear *highlighted*. If the visual is a continuous sequence (visual element type: moving) it can *play* on scroll.

Animation type of the transition: What kind of animation runs during the transition. The visual can *fade in* or *out*; it can *morph* (*vector animation*); it can be moved, resized or rotated (*image animation*); it can *pan-and-zoom* in the viewport; or it can resemble a *movie* which is played back.

Animation control: The animation can be triggered by the scroll and run for a *fixed duration* from beginning to end; or it can be *scroll-controlled* in that the reader can move forward and backward in the animation through scrolling.

In the next step, we grouped scrollers with similar configurations of scrollly-atoms together and identified five major distinct ‘scrollytelling techniques’: **graphic sequence, animated transitions, pan-and-zoom, show-and-play; and moviescroller.**

To verify our findings, we used the kModes-Clustering-Algorithm.⁵ The elbow curve indicated that the usefulness of additional categories started to decline after four categories. The groupings show that the configuration of the scrollly-atoms is homogenous for the graphic sequence and the show-and-play techniques. Pan-and-zoom and animated transitions also appear but are more heterogeneous. Finally, as there are few examples of moviescrollers, these are grouped with show-and-play. The verification step, therefore, generally supported the techniques we had identified.

For each scrollytelling technique, we identified the most common configuration of scrollly-atoms

(see *Table 1*). We then described this prototypical disposition in a short paragraph, and this description formed the basis of our library of scrollytelling techniques. Finally, for the most commonly used technique in our newsroom, we created a new scrollytelling tool.

4. A library of scrollytelling techniques

The scrollytelling techniques (see *Figure 1*), as well as possible implementation strategies and examples, are documented in our public style guide.⁶ This scrollytelling library is aimed primarily at designers who create visuals for scrollers and developers who implement them. The secondary target audience is the editorial staff that collaborates with visual journalists and developers on the creation of scrollytelling articles. The techniques and corresponding prototypical examples are briefly described in the following paragraphs.

Table 1. Each scrollytelling technique has a typical configuration of scrollly-atoms. Exceptionally, there may, for some keys, be no clear majority value. In these cases, we denoted the value as ‘any’

Technique	Layout of the visual	Scroll-behavior of the visual	Scroll-behavior of the text	Visual-Text-Relation	Type of visual	Transition type	Animation type of the transition	Animation control
Graphic sequence	Full	Fixed	Vertical	One-to-one	Static	Swap	Fade	Fixed duration
Animated transitions	Partial	Fixed	Vertical	One-to-one	Static	Transform	Vector animation	Fixed duration
Pan-and-zoom	Full	All-directions	All-directions	One-to-many	Static	Transform	Pan and zoom	Scroll-controlled
Moviescroller	Any	Fixed	Vertical	One-to-many	Moving	Play	Movie	Scroll-controlled
Show-and-play	Any	Fixed	Vertical	Any	Moving	Play	Movie	Fixed duration

Five scrollytelling techniques

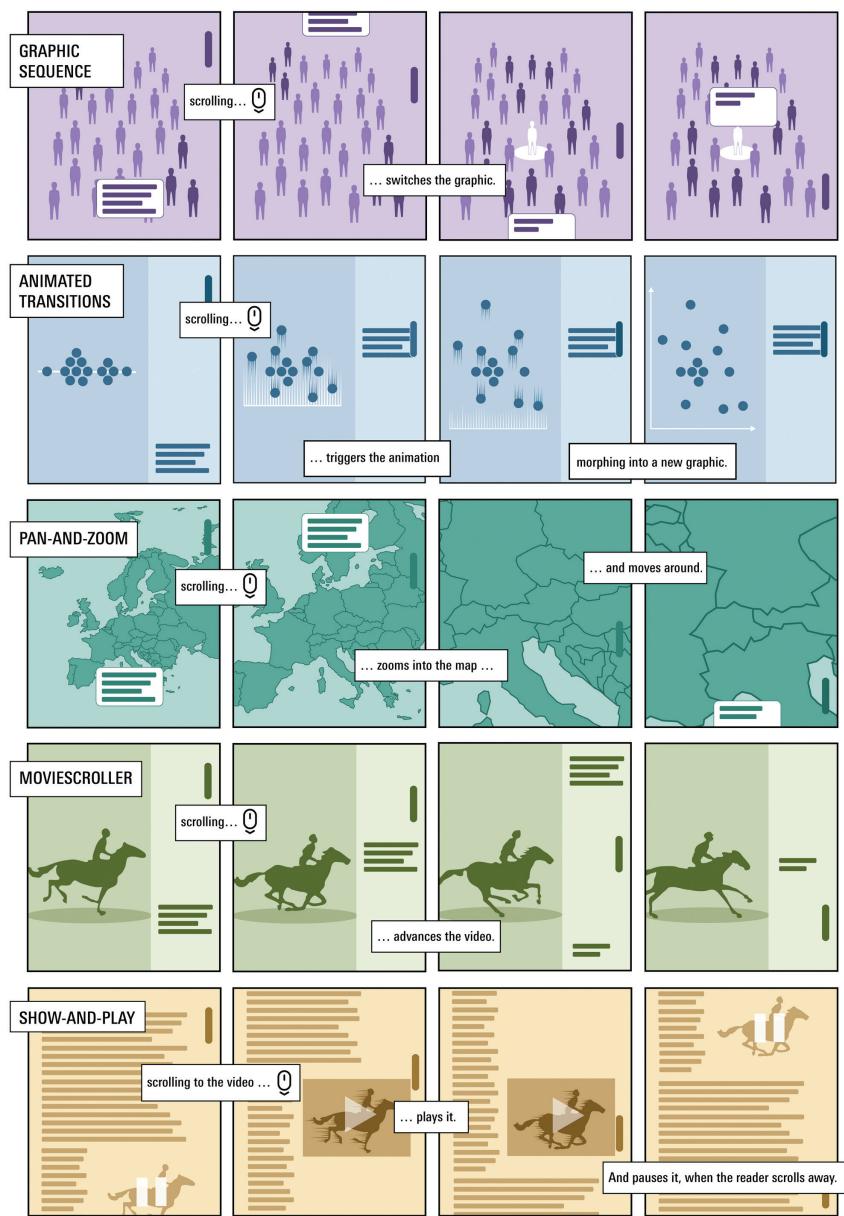


Figure 1. A visual explanation of the five scrollytelling techniques

4.1 Graphic sequence

In a graphic sequence, the visual stays fixed in place. As the user scrolls, text blocks move over the visual, and are replaced with a new one. The transition is usually animated with a slight fading animation (see *Figure 2*).

This technique is often used for showing and highlighting information on a visualization step by step,⁷ and works well if the dimensions of visuals are kept the same throughout the scroller. Other examples use photographs to make a before-after comparison.⁸

A prototypical example by El País⁷ shows an isometric illustration of a living room with six people in it, one of which is infected with Sars-CoV-2. At each step, the scroller goes on to present a scenario: how many people would get infected if they wore masks, or if they opened the windows. The people are highlighted either in red or blue to show if they were infected or not.

Figure 2. The scrollly-atoms of a prototypical **graphic sequence**

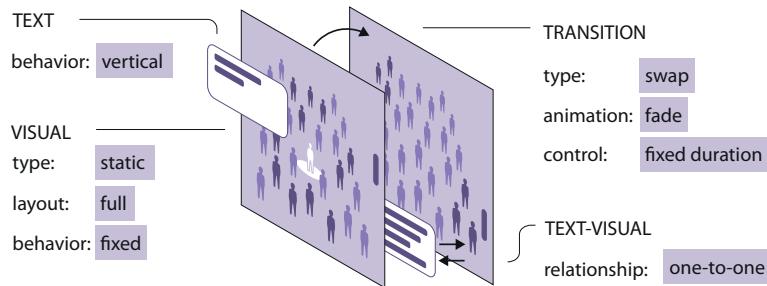
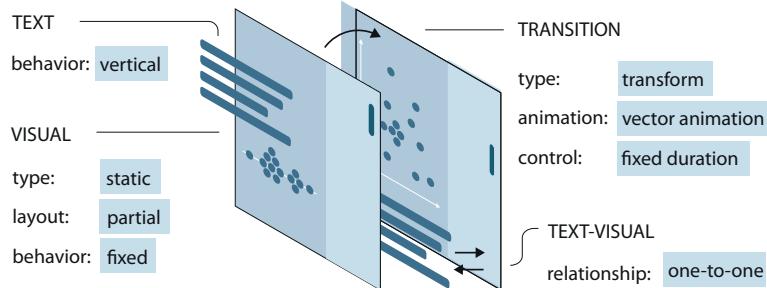


Figure 3. The scrollly-atoms of a prototypical **animated transition** scroller



We have used the graphic sequence technique frequently in customized articles (see *The Problem*). So, we built a new tool for our charting toolbox. This tool allows visual journalists to create graphic sequences with ease. Visual journalists are now able to upload visuals for different device sizes and add text to each one of them. They can also activate or deactivate the fading transition between the visuals.

4.2 Animated transition

In this scrolllytelling technique, visuals stay fixed as the text scrolls alongside. Animation is used to transition from one visual to another, morphing between two vector graphics. The morphing is triggered at a certain scroll position and typically plays for a fixed duration (see *Figure 3*).

This technique is often used to build up complex visualizations step by step, adding a dimension with each stage.⁹ Another common use case is to show different aspects of the data by regrouping symbols in a unit visualization.¹⁰ This technique is also used for transitioning from one visualization to another¹¹ or for animating paths on a map.¹²

A prototypical example⁹ starts with a beeswarm-plot, showing how long it takes to read privacy policies of different, well-known websites. The next step adds ‘reading difficulty’ on the y-axis. The points from the beeswarm plot spread out vertically to form a scatter plot. Finally, a time-dimension is introduced: a line animates to connect points from different years, ending up as a connected scatter plot.

4.3 Pan-and-Zoom

The pan-and-zoom technique allows the user to control which section of the visual is visible in the browser’s viewport. Scrolling causes the visual to zoom and/or pan. The zooming-/panning-movement is animated and the speed of the animation is tied to how fast readers are scrolling (see *Figure 4*).

Figure 4. The scrollly-atoms of a prototypical **pan-and-zoom** scroller

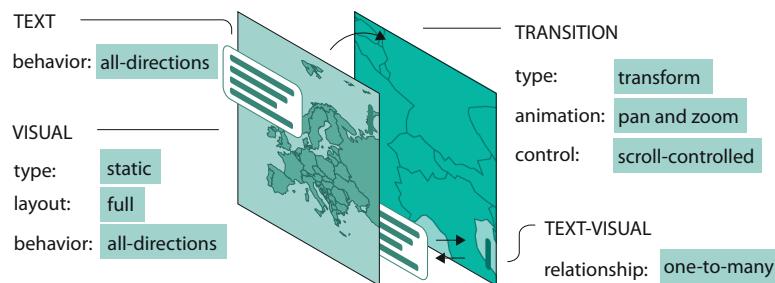


Figure 5. The scrollly-atoms of a prototypical **moviescroller**

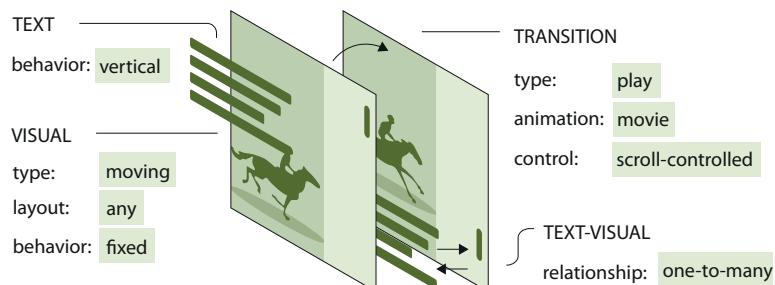
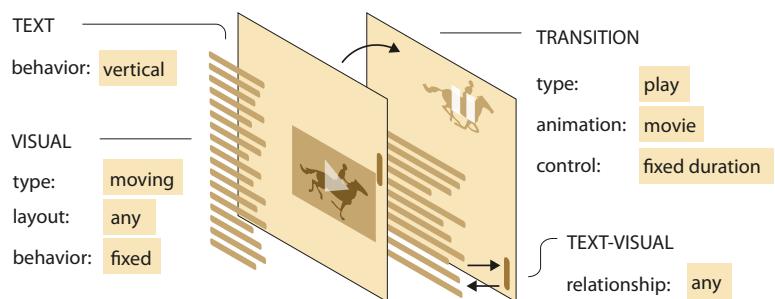


Figure 6. The scrollly-atoms of a prototypical **show-and-play** scroller



advance through the movement slowly. Text blocks scroll into view at crucial moments to explain what is happening.

4.5 Show-and-Play

The show-and-play technique makes elements appear on screen as the users scroll. These elements can be static, but mostly they are animated GIFs or videos. When these elements appear, they automatically start to play in a loop. Playback stops, as soon as the reader scrolls away (see *Figure 6*).

Many of the examples that implement show-and-play use videos with reduced motion to set a mood and bring an image to life.¹⁸ Others use it to start playing animations that show, for example, change over time.¹⁹

ProPublica uses show-and-play videos¹⁸ to present different buildings on a Hawaiian beach. House owners built walls towards the sea, making the sandy beaches disappear. The looped videos show clearly how the waves hit against these ‘seawalls’.

The library of scrollytelling techniques is used in our newsroom on a daily basis. Developers, visual journalists, and editors collaborate using a shared vocabulary to explore different types of scrollytelling. Furthermore, thanks to our internal graphic sequence tool, non-coding, visual journalists publish scrollytelling articles almost every week. All this means that scrollers are now being created with ease and in a matter of days. This has allowed us to move scrollytelling from a long-form to a news format (see *Figure 7*).

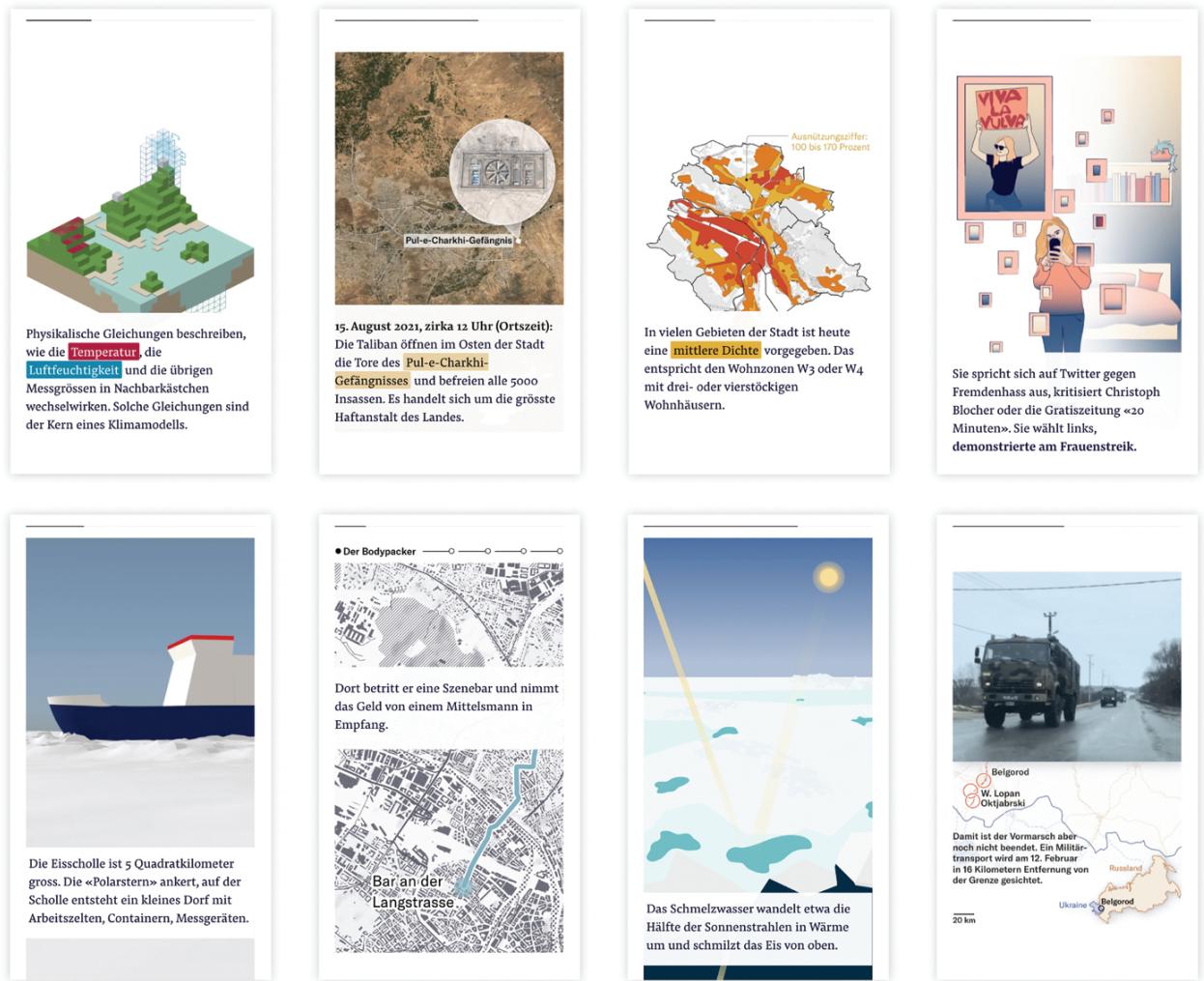


Figure 7. The top row shows four graphic sequences—produced with the tool we implemented according to our research. The bottom row shows examples of a moviescroller, pan-and-zoom, animated transitions and show-and-play. All of them were designed and developed with the descriptions of the respective techniques in mind

5. Conclusion

Because scrollytelling is a non-standard behaviour, it is seen as labour-intensive and costly to produce. However, not all scrollers are that unique. Visualization researchers have noted recurring patterns and have used them to build tools that make it easier to create scrollers. These works consciously limited their scope to one scrollytelling pattern.

This study identifies and describes five standard scrollytelling techniques. At Neue Zürcher Zeitung, we frequently use these techniques to discuss and implement scrollytelling articles. These techniques have allowed us to produce scrollers faster and at the same time introduce variety in our digital storytelling.

The techniques cover many of the scrollers that are being produced by newsrooms, but not all of them. As the field evolves, it is very well possible that new patterns will gain traction. Finally, each technique has different usability pitfalls. Further research into how users read and understand scrollers may refine the scrollty-atoms and lead to a solid best practice for scrollytelling.

Newsrooms can use the vocabulary and the definitions elaborated in this paper to inform the design of their own scrollers. We also hope that this work may inspire others to reflect on, document, and share their design patterns.

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Notes

1. "Snow Fall – The Avalanche at Tunnel Creek": <https://www.nytimes.com/projects/2012/snow-fall/index.html>
2. Long-form journalism refers to longer-than-usual articles, often with in-depth, expository reporting.
3. Q-Toolbox: <https://q.tools>
4. One of the commercial scrollytelling tools we had first considered for our use case was Shorthand (<https://shorthand.com/>).
5. The kModes algorithm is a clustering method that maximizes similarity within a given number of groups. A more detailed description can be found here: <https://www.analyticsvidhya.com/blog/2021/06/kmodes-clustering-algorithm-for-categorical-data/>. We use the Python kModes-library: <https://pypi.org/project/kmodes/>
6. NZZ Visuals – Styleguide: <https://nzzdev.github.io/Storytelling-Styleguide/#/einfuehrung>
7. "A room, a bar and a classroom: how the coronavirus is spread through the air": <https://elpais.com/especiales/coronavirus-covid-19/a-room-a-bar-and-a-class-how-the-coronavirus-is-spread-through-the-air/>
8. "A city transformed": <http://graphics.wsj.com/rio-city/>
9. "We Read 150 Privacy Policies. They Were an Incomprehensible Disaster.": <https://www.nytimes.com/interactive/2019/06/12/opinion/facebook-google-privacy-policies.html>
10. "1000 Times Gold": <https://www.washingtonpost.com/graphics/sports/olympics/the-1000-medals-of-the-united-states/>
11. "Why EU Regions are Redrawing Their Borders": <https://pudding.cool/2019/04/eu-regions/>
12. "The race to save the River Ganges": <https://graphics.reuters.com/INDIA-RIVER/010081TW39P/index.html>
13. "The Great Flood of 2019": <https://www.nytimes.com/interactive/2019/09/11/us/midwest-flooding.html>

14. "Leben im Zürichsee": <https://interaktiv.tagesanzeiger.ch/2020/zuerichsee/>
15. "Rose Garden ceremony attendees who tested positive for coronavirus": <https://www.washingtonpost.com/graphics/2020/politics/coronavirus-attendees-barrett-nomination-ceremony/>
16. "Sunisa Lee – the Gymnast": <https://www.nytimes.com/interactive/2021/sports/olympics/suni-lee-gymnastics.html>
17. "How a Massive Bomb Came Together in Beirut's Port": <https://www.nytimes.com/interactive/2020/09/09/world/middleeast/beirut-explosion.html>
18. "Hawaii's Beaches are disappearing": <https://projects.propublica.org/hawaii-beach-loss/>
19. "2014 Was the Hottest Year on Record": <https://www.bloomberg.com/graphics/2014-hottest-year-on-record/>

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Annex 1

Cluster	Example	Year	Link	Journal	Visual layout	Scrolf behavior of visual	Scrolf behavior of text	Visual Febulation	Transition type	Animation type	Animation control	Technique	
0	We can't seem to hear Trump's	2019	https://www.nytimes.com/interactive/2019/01/10/science/coronavirus/index.html	Reuters	Full	Vertical	Horizontal	Many-to-One	Transform	Vector animation	Scrolf-controlled	None	
0	How to Help Limit the Spread of Coronavirus	2020	https://www.nytimes.com/2020/01/20/science/coronavirus.html	WSJ	Full	Horizontal	Horizontal	Many-to-More	Highlight	Image animation	Scrolf-controlled	Pan-and-zoom	
0	I'm helping to protect the NHS!	2020	https://www.bbc.com/news/health-52409098	BBC	Full	Vertical	One-to-More	Highlight	Image animation	Scrolf-controlled	None		
0	A nation divided	2014	https://www.nytimes.com/2014/01/05/us/germany-unification-a-nation-divided.html	NYTimes	Full	Horizontal	None	Static	Transform	Pan and zoom	Scrolf-controlled	None	
0	The Great Reset of 2019	2019	https://www.nytimes.com/interactive/2019/01/23/us/great-reset-global-governance.html	NYTimes	Full	Vertical	Pan and zoom	Static	Transform	Pan and zoom	Scrolf-controlled	Pan-and-zoom	
0	How to Win Friends and Influence People	2019	https://www.nytimes.com/interactive/2019/01/23/us/great-reset-global-governance.html	NYTimes	Full	Vertical	Pan and zoom	Static	Transform	Pan and zoom	Scrolf-controlled	Pan-and-zoom	
0	Eden on Zürichsee	2020	https://www.nytimes.com/interactive/2020/01/29/switzerland/eden-zuerichsee.html	Tagesanzeiger	Full	Vertical	Fixed	One-to-More	Static	Transform	Pan and zoom	Scrolf-controlled	Pan-and-zoom
0	What Will the World Might Look Like in the Age of Covid-19	2020	https://www.nytimes.com/interactive/2020/01/29/science/coronavirus-what-world-might-look-like.html	NYTimes	Full	Horizontal	Horizontal	One-to-More	Static	Transform	Pan and zoom	Scrolf-controlled	Pan-and-zoom
0	Mapping America's racial population shifts over the last decade	2021	https://www.washingtonpost.com/interactive/2021/03/03/race-migration-us-map.html	Washington Post	Full	Pan and zoom	Vertical	One-to-One	Static	Transform	Pan and zoom	Scrolf-controlled	Pan-and-zoom
0	What Is the Climate Crisis?	2020	https://www.nytimes.com/interactive/2020/01/23/science/climate-change.html	NYTimes	Full	Vertical	Vertical	One-to-More	Static	Transform	Pan and zoom	Scrolf-controlled	Pan-and-zoom
0	What is permafrost and why might it be the climate change time bomb?	2019	https://www.nytimes.com/interactive/2019/01/23/science/permastone-time-bomb.html	NYTimes	Full	Pan and zoom	None	None	Static	Transform	Pan and zoom	Scrolf-controlled	Pan-and-zoom
1	Time Is Running Out to See the Last of the World's Rainforest	2020	https://www.bloomberg.com/opinions/articles/2020-01-29/the-last-of-the-rainforests	Bloomberg	Inline	Vertical	One-to-One	Moving	Highlight	Movie	Fixed duration	Show-and-play	
1	The Future of Arctic Shipping	2019	https://www.nytimes.com/interactive/2019/01/29/science/arctic-shipping.html	NYTimes	Part	Fixed	Vertical	One-to-One	Moving	Play	Movie	Fixed duration	Show-and-play
1	Trump's Arctic Ambitions	2020	https://www.nytimes.com/interactive/2020/01/29/us/trump-arctic-ambitions.html	NYTimes	Full	Vertical	One-to-More	Moving	Play	Movie	Fixed duration	Show-and-play	
1	A visual introduction to machine learning	?	https://www.cs.toronto.edu/~mce/vis/intro-to-machine-learning-pain-1/	K03	Part	Fixed	Vertical	One-to-Many	Moving	Play	Movie	Scrolf-controlled	Mostrunner
1	Hawaii's Beaches are disappearing	2020	https://www.nytimes.com/interactive/2020/01/29/science/hawaii-beach-loss.html	PopPublic	Full	Fixed	Vertical	One-to-Many	Moving	Play	Movie	Fixed duration	Show-and-play
1	Hawaii's Beaches are disappearing	2020	https://www.nytimes.com/interactive/2020/01/29/science/hawaii-beach-loss.html	PopPublic	Part	Fixed	Vertical	One-to-Many	Moving	Play	Movie	Scrolf-controlled	Mostrunner
1	How to Get Out	2020	https://www.nytimes.com/interactive/2020/01/29/science/how-to-get-out.html	NYTimes	Full	Vertical	One-to-One	Moving	Transform	Image animation	Fixed duration	Animated transition	
1	Sunrise Lot	2021	https://www.nytimes.com/interactive/2021/01/29/science/sunrise-lot-communities.html	NYTimes	Part	Fixed	Vertical	One-to-More	Moving	Play	Movie	Fixed duration	Show-and-play
1	Sunrise Lot	2021	https://www.nytimes.com/interactive/2021/01/29/science/sunrise-lot-communities.html	NYTimes	Full	Vertical	One-to-Many	Moving	Play	Movie	Scrolf-controlled	Mostrunner	
1	Objective or Biased	2021	https://www.nytimes.com/interactive/2021/01/29/science/objective-biased.html	K03	Full	Fixed	Vertical	One-to-One	Moving	Play	Movie	Fixed duration	Show-and-play
1	Trump's Arctic Ambitions	2020	https://www.nytimes.com/interactive/2020/01/29/us/trump-arctic-ambitions.html	NYTimes	Full	Vertical	One-to-Many	Moving	Play	Movie	Scrolf-controlled	Mostrunner	
2	How's the Amazon is Burning and Why It's Going to Get Worse	2020	https://www.bloomberg.com/opinions/articles/2020-01-29/amazon-amazon-is-on-fire	Bloomberg	Full	Fixed	Vertical	One-to-One	Static	Sweep	Fade	Read duration	Graphic sequence
2	How's the Amazon is Burning and Why It's Going to Get Worse	2020	https://www.bloomberg.com/opinions/articles/2020-01-29/amazon-amazon-is-on-fire	Bloomberg	Full	Fixed	Vertical	One-to-One	Moving	Play	Movie	Fixed duration	Show-and-play
2	It's far and a classroom: how the coronavirus is spreading through the air	2020	https://www.nytimes.com/interactive/2020/03/26/science/coronavirus-air-spread.html	El Pais	Full	Fixed	Vertical	One-to-One	Static	Sweep	Fade	Read duration	Graphic sequence
2	The Following Follower	2019	https://www.nytimes.com/interactive/2019/01/29/science/ai-following-follower.html	NYTimes	Full	Fixed	Vertical	Many-to-One	Static	Transform	Fade	Read duration	Graphic sequence
2	The nose to see the next George	2019	https://www.nytimes.com/interactive/2019/01/29/science/nose-next-george.html	NYTimes	Full	Fixed	Vertical	One-to-One	Static	Transform	Fade	Read duration	Graphic sequence
2	Trump, His Children, and 100s: Potential Conflicts of Interest	2020	https://www.nytimes.com/interactive/2020/01/29/politics/trump-conflict-interest.html	WSJ	Part	Fixed	Vertical	One-to-One	Static	Transform	Fade	Read duration	Graphic sequence
2	A City Transformed: Rio Before and After Olympic Construction	2016	https://www.nytimes.com/2016/08/07/science/rio-before-after.html	NYTimes	Full	Fixed	Vertical	One-to-One	Static	Transform	Fade	Read duration	Graphic sequence
2	Am I Helping to Protect the NHS?	2020	https://www.nytimes.com/interactive/2020/01/29/science/nhs-coronavirus.html	NYTimes	Full	Fixed	Vertical	One-to-Many	Static	Transform	Fade	Read duration	Graphic sequence
2	The greatest danger of the Schrems – and what it means to us	2019	https://www.nytimes.com/2019/06/26/science/greatest-danger-schrems-what-means.html	NYTimes	Full	Fixed	Vertical	One-to-Many	Static	Transform	Fade	Read duration	Graphic sequence
2	Die Milizien, die pragen	2019	https://www.nytimes.com/2019/06/26/politics/deutschland-2019-what-is-west-end-revolution-aberding.html	Die Zeit	Full	Fixed	Vertical	One-to-One	Static	Highlight	Fade	Read duration	Graphic sequence
2	How Trump Recklessly Elects Again	2016	https://www.nytimes.com/2016/11/03/science/trumps-new-vote-pooling.html	NYTimes	Full	Fixed	Vertical	One-to-One	Static	Transform	Fade	Read duration	Graphic sequence
2	How's the Amazon is Burning and Why It's Going to Get Worse	2020	https://www.nytimes.com/interactive/2020/01/29/science/amazon-is-burning.html	PopPublic	Full	Fixed	Vertical	One-to-One	Static	Transform	Fade	Read duration	Graphic sequence
2	We Resist 150 Privacy Policies. Why They're Incomprehensible Disaster	2019	https://www.nytimes.com/2019/01/29/technology/privacy-policies.html	NYTimes	Part	Fixed	Vertical	One-to-One	Static	Transform	Fade	Read duration	Graphic sequence
2	Where Americans Voted by Mail in the 2020 Elections	2020	https://www.nytimes.com/2020/01/29/us/electoral-vote-by-mail.html	NYTimes	Full	Fixed	Vertical	One-to-Many	Static	Transform	Fade	Read duration	Graphic sequence
2	It's still not getting there	2020	https://www.nytimes.com/2020/01/29/science/its-still-not-getting-there.html	NYTimes	Full	Fixed	Vertical	One-to-Many	Static	Transform	Fade	Read duration	Graphic sequence
2	More than 100 million people shifted away from their homes over last decade	2021	https://www.nytimes.com/2021/01/29/science/more-than-100-million-people-shifted-away-from-homes-over-last-decade.html	Washington Post	Full	Fixed	Vertical	One-to-Many	Static	Transform	Fade	Read duration	Graphic sequence
2	What is permafrost and why might it be the climate change time bomb?	2019	https://www.nytimes.com/2019/01/29/science/permastone-time-bomb.html	NYTimes	Full	Fixed	Vertical	One-to-Many	Static	Transform	Fade	Read duration	Graphic sequence
3	The Fellowship of the Ring	2019	https://www.nytimes.com/interactive/2019/01/29/science/fellowship-ring.html	NYTimes	Full	Fixed	Vertical	One-to-Many	Static	Transform	Fade	Read duration	Graphic sequence
3	We Can't Stop the Virus Will Be Delivered to Millions, From Factory to Front Line	2020	https://www.nytimes.com/interactive/2020/01/29/science/virus-delivered-millions-factory-front-line.html	NYTimes	Full	Fixed	Vertical	One-to-Many	Static	Transform	Fade	Read duration	Graphic sequence
3	How many coronary stenoses will need treated for conservative care	2020	https://www.nytimes.com/2020/01/29/science/coronary-stenoses.html	NYTimes	Full	Fixed	Vertical	One-to-Many	Static	Transform	Pan and zoom	Scrolf-controlled	Animated transition
3	The grueling Sprints of Schrems – and what it means to us	2019	https://www.nytimes.com/2019/06/26/science/schrems-sprints.html	NYTimes	Full	Fixed	Vertical	One-to-Many	Static	Transform	Pan and zoom	Scrolf-controlled	Animated transition
3	Do Milizien, die pragen	2019	https://www.nytimes.com/2019/06/26/politics/deutschland-2019-what-is-west-end-revolution-aberding.html	Die Zeit	Full	Fixed	Vertical	One-to-Many	Static	Transform	Pan and zoom	Scrolf-controlled	Animated transition
3	Could Trump Really Deploy Millions of Unauthorized Immigrants?	2017	https://www.nytimes.com/2017/01/29/science/trump-unauthorized-immigrants.html	NYTimes	Full	Fixed	Vertical	One-to-Many	Static	Transform	Pan and zoom	Scrolf-controlled	Animated transition
3	Will the Arctic Shipping Lane Be Unlocked?	2016	https://www.nytimes.com/2016/01/29/science/arctic-shipping-lane-unlocked.html	DASS	Full	Fixed	Vertical	One-to-Many	Static	Transform	Pan and zoom	Scrolf-controlled	Animated transition
3	We support the gender parity in the House of Representatives	2018	https://www.nytimes.com/2018/01/29/science/gender-parity-house-reps.html	NYTimes	Full	Fixed	Vertical	One-to-Many	Static	Transform	Pan and zoom	Scrolf-controlled	Animated transition
3	Who Needs a Car? Get Ready for the Autonomous Crisis?	2020	https://www.nytimes.com/2020/01/29/science/autonomous-cars-crisis.html	NYTimes	Full	Fixed	Vertical	One-to-Many	Static	Transform	Pan and zoom	Scrolf-controlled	Animated transition
3	How to Make a Black Hole in a Lab	2019	https://www.nytimes.com/2019/01/29/science/black-hole-lab.html	NYTimes	Full	Fixed	Vertical	One-to-Many	Static	Transform	Pan and zoom	Scrolf-controlled	Animated transition
3	How Coronavirus spread across the globe – visualized	2016	https://ltt.com/science/spotlight/coronavirus.html	Financial Times	Part	Pan and zoom	Vertical	One-to-Many	Static	Highlight	Pan and zoom	Scrolf-duration	Pan-and-zoom
3	One belt, one road	2019	https://www.nytimes.com/interactive/2019/01/11/politics/obama-one-belt-one-road.html	NYTimes	Part	Fixed	Vertical	One-to-Many	Static	Highlight	Pan and zoom	Scrolf-duration	Pan-and-zoom
3	October Democratic Debate: The Biggest Stage Ever	2019	https://www.nytimes.com/interactive/2019/01/11/politics/democratic-debate.html	NYTimes	Part	Fixed	Vertical	One-to-One	Static	Highlight	Image animation	Read duration	Other

About the authors

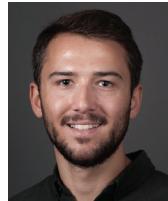
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