[2]

Let's Dance: GIF 1.0 versus GIF 2.0

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Flash-forward

Anno 2024, the Graphics Interchange Format (GIF) has come to be commonly used for the recording of living cells. By repurposing a compression format into a scientific tool, the human species has now at its disposal "black boxes" of human bodies, including their brains. They no longer need memory implants, as envisioned 20 years earlier by Omar Naim's sci-fi movie *The Final Cut* (2004); instead, bacteria are currently programmed "to snuggle up to cells in the human body and to record what they are doing, in essence making a 'movie' of each cell's life" (Kolata 2017). In less than a decade, scientists have managed to improve their DNA experiments with moving images from in-cell storage to in-cell recording.

In the summer of 2017, the first results of storing moving images in the DNA of living cells had indeed seemed very promising. The research team at Harvard Medical School and Harvard University had also expressed quite optimistic views on the system's recording capacity (Shipman et al. 2017). The use of *biological* DNA and the perspective to deploy it not only for archiving but also for recording had marked a clear difference from previous efforts to store visual data in DNA. In the spring of 2016, celebrating its centenary year, Technicolor had showcased the successful encoding of Georges Méliès's *A Trip to the Moon* (1902) into *synthetic* DNA, storing a million copies of the digitized version of this early cinema classic into a few

droplets of water (Taggart 2016). Technicolor had thus set the trend for film archives and image banks worldwide: digitization was no longer the final stop but the first necessary step for encoding into (nonbiological) DNA.[1]

The biological DNA applied as (visual) information storage system in the 2017 experiments had belonged to a population of gut bacteria. The online version of *The New York Times* had published the breaking news at the time, captivating the attention of the reader with two (almost!) identical looping animated GIFs of a racing horse, placed directly under the headline. Thanks to its wide circulation on social media, the newspaper article had of course intrigued many film scholars. They had immediately recognized the double GIF animation, despite its strong pixilation, as the pioneering photographic experiment carried out 139 years earlier, in 1878, by Eadweard Muybridge, commissioned by Leland Stanford to prove that all four feet of a horse were off the ground at the same time while trotting. The scholarly audience had been baffled by this Muybridge strip being encoded as a sequence of DNA molecules and had paid little attention to the fact that *The New York Times* totally neglected the visual difference between the two GIFs, that is, the "original image" or encoded GIF, stored in the DNA of the living gut bacteria, and the "reconstructed image" or recall GIF, retrieved from those very same bacteria (Kolata 2017).

From the perspective of format theory, it would have been relevant to look more closely at the dancing dots that had made their appearance in the recall GIF, all around the horse; moreover, a white dot had provided the animal with an eye and a black dot at the bottom had seemed like a signature. In other words, instead of losing information, new data had been added from one phase to the other, from storage to retrieval. Clearly, in the 2017 DNA storage experiments, the GIF was no longer functioning as a lossless compression format, but it had become the content of a new format, the living cell, and as such was subject to alteration.[2] Like the audio file format MP3, the GIF had been a "container technology" par excellence. Borrowed from Lewis Mumford, the notion of "container technology" entered format studies by way of Jonathan Sterne (2006). Often overlooked by technology scholars because of their (seeming) passivity, containers are

1 Technicolor's laboratories developed their revolutionary storage technology in collaboration with Harvard University. Already in 2012, Harvard scientists had "successfully stored 5.5 petabits of data—around 700 terabytes—in a single gram of DNA, smashing the previous DNA data density record by a factor of one thousand" (Taggart 2016). For a more detailed research report, see Goela and Bolot (2017).

2 This altered outcome had to do with the coverage (or depth) in DNA sequencing, which is counted in numbers of reads. The higher the number of reads, the less "noise" we get. See Shipman et al. (2017).

not experienced as such; they are not experienced for what they are (e.g., file formats) but for what they contain (e.g., music, animation). About MP3s, Sterne writes: "they are important precisely because they are useful but do not call attention to themselves in practice" (Sterne 2006, 826). Just as the MP3 had become synonymous with the song it contained, being ascribed the "status of a thing" (Sterne 2006, 830), so the GIF had been objectified: it had become the animated loop to be added to your GIF collection.

In 2017, however, the GIF had become not only the "contained" of a new "container" but also an essential part of medical research. In fact, the main goal of the Harvard scientists had not been to solve archiving issues of moving images but rather to understand "both the basic biology of bacterial adaptation and its technological applications" (Shipman et al. 2017, 345). Thus, the GIF had been turned into a tool, that is, the active counterpart of Mumford's container technology. The aim of this chapter is precisely to reconstruct the GIF's function as tool, to study—retrospectively—how the GIF became a format to be actively used, for multiple purposes, from time-lapse weather maps to grassroots net design, from communicative strategies on social media to genetics and DNA storage "with an eye towards future biological recordings" (Shipman et al. 2017, 345). The method used at the time by the Harvard scientists was CRISPR-Cas, a powerful editing system that allowed for modifying DNA. CRISPR stands for clustered regularly interspaced short palindromic repeats. CRISPRs are short DNA segments that are repeated, like looping animated GIFs, over and over again. One might also hypothesize that the transparency of the used GIF, rendering a black racing horse against a white or neutral background, played in favor of the successful completion of the experiment. As will be further discussed below, both loop and transparency are two defining characteristics of the GIF. As for the dancing dots that appeared around the racing horse in the recall GIF of the 2017 experiment, it will be compelling to find an (unrelated) progenitor in the early history of the World Wide Web.

Flashback

In 1983, David Bowie released his album *Let's Dance*. The same year, on June 20, Terry Welch filed the patent for a new lossless data compression algorithm, LZW, called after its three inventors: Lempel–Ziv–Welch.[3] It was an improved version of a previous compression algorithm, LZ78 (1978). The

3 The LZW inventors' full names are Abraham Lempel, Jacob Ziv, and Terry Welch.

LZW patent was granted on December 10, 1985.[4] In the meantime, Welch had published an article in the *IEEE Computer* magazine in which he gave a very detailed and, for computer programmers, readily understandable and usable description of the algorithm, without however mentioning that its patent was still pending. Welch referred to the lossless-ness of the new compression technique in terms of both transparency, in that "the computer programmer is not aware of the existence of compression except in system performance," and "noiseless"-ness, in that "the decompressed data is an exact replica of the input data" (Welch 1984, 8).

In June 1987, four years after the filing of the LZW patent, the graphics development team at CompuServe Information Service (also known as CIS) released the Graphics Interchange Format. As one of America's major information network systems, CompuServe offered, before the existence of the web, "hourly subscription services that provided access to email, forums, file transfers, and chat" (Eppink 2014, 299). The company had already introduced a black-and-white image format, RLE,[5] which the GIF supplanted as a color alternative. From its origin, the GIF could handle anything from two to 256 colors,[6] with its graphics data compressed using LZW. CompuServe was not the first but also not the last company to implement this algorithm, acting in good faith convinced it was freeware.

One year earlier, in September 1986, the Sperry Corporation, for which Welch was working when he filed the infamous patent, had merged with the Burroughs Corporation to form the Unisys Corporation. Unisys retained all of Sperry's patents, including LZW, of which they apparently were not well informed. It took more than seven years, till December 1994, before Unisys took action. By then the GIF was used widely by not only software developers but also commercial sites; moreover, it had become extremely popular among end users. Unisys's tactics to capitalize on the GIF led to a lot of controversy. Subsequently, the LZW patent became known as the "GIF tax" (Battilana 2004), and the League for Programming Freedom launched "a 'Burn All GIFs' campaign" (Eppink 2014, 300). Yet this did not stop GIF's

4 The US patent number of the LZW algorithm is 4,558,302.

5 RLE stands for run-length encoding.

6 Nowadays the GIF still has a 256 color palette, but there are tricks to circumvent this restriction. As specified on the *Tech Terms Computer Dictionary*, "A GIF image can actually store more than 256 colors. This is accomplished by separating the image into multiple blocks, which each continue unique 256 color palettes. The blocks can be combined into a single rectangular image, which can theoretically produce a 'true color' or 24-bit image. However, this method is rarely used because the resulting file size is much larger than a comparable .JPEG file."

popularity from rising even more, and the controversy continued until Welch's patent finally expired, 20 years after filing, on June 20, 2003.[7]

Important to stress in terms of format is that the LZW algorithm has remained the leading technique for general-purpose data compression due to its simplicity and versatility. It remains the basis of many PC utilities that claim to double the capacity of hard drives. In the mid-1980s, it was a matter not only of space but also and especially of speed because back then modems used costly telephone lines to dial into Internet service providers. Not surprisingly, one of the main reasons why the graphics development team at CompuServe developed the GIF was to facilitate and accelerate the process of downloading. But the GIF was also designed, as already mentioned, as a color alternative to its monochrome predecessor because "the company wanted to display things like color weather maps," which is how Steve Wilhite, who had "an interest in compression technologies," invented the GIF (O'Leary 2013). As the official father of the format, Wilhite insists, even today, that the correct pronunciation of the acronym is with a soft *g* (as in jif).[8]

GIF87a vs. GIF89a

The alleged first GIF created by Wilhite was a picture of an airplane, now coming back to life online with an animated and looped background and passing as the very first GIF ever.[9] Yet Wilhite claims that he never made an animated GIF himself. In fact, the airplane GIF with animated background is not an original GIF from 1987, because, very simply, its format is not GIF87a. As one can verify by opening the file in a text editor, it is instead GIF89a, which is the enhanced version of the format, released two years later.

Besides combining indexed color with lossless data compression (that is, on the one hand, giving in on image quality and, on the other, preventing image degradation),[10] the real asset of the GIF, its key to success, lies of course in its capacity to store multiple images in a single file. While this spec was already defined in GIF87a, it was not originally meant to make animations possible, but "to save memory by eliminating redundant data"

7 This is a simplified version of the legal issues and litigations, regarding GIF using LZW. For a more detailed version, see Battilana (2004).

8 For the heated debate about the acronym's correct pronunciation, see "The GIF Pronunciation Page" (Olsen, n.d.).

9 See "The First GIF Ever," *Know Your Meme*: https://knowyourmeme.com/photos/1267516-gif.

10 This makes the GIF still today an attractive alternative to, for instance, JPEG.

(Eppink 2014, 299). GIF89a added background transparency and some other specs, such as delay times and image replacement parameters, to make the multiple-image-storage feature more useful for animation.[11] This could be identified as the first pivotal moment in GIF's history, marking its shift from format to tool. As documented in CompuServe Monthly Status Reports, the first implementation of GIF animation was a non-repetitive "time-lapse weather map" (Eppink 2014, 299).

Up to 1995, an animated GIF would play only once. It was not until the release of Netscape Navigator 2.0 that GIFs could be displayed in looped sequences, thanks to the Netscape Looping Application Extension, which became the most popular Application Extension Block of GIF89a.[12] This meant another turning point, whereby the browser was given a leading role. In fact, one could say that it is the browser that loops (or even makes) the GIF, turning the data storage file into a continuously moving image. But, technically speaking, it is the Application Extension Block within the GIF's syntax that tells the browser to loop the file. So, the command is embedded in the GIF itself, which means a reinforcement of its function as tool.

All this happened in 1995 when Unisys started claiming royalties for its LZW patent. CompuServe and other developers began working on a freely usable successor to GIF, which led to the creation of PNG (officially, "Portable Network Graphics"; unofficially, "Png is Not Gif"). While PNG was endorsed by the World Wide Web Consortium (W3C) as a "W3C Recommendation," most Internet browsers could not directly handle this new format and continued to support GIFs, in particular animated GIFs (Battilana 2004). Software developer Mike Battilana adds: "As a result, GIF became more difficult to replace with PNG, since PNG was not designed to support animation" (Battilana 2004). Then there were efforts to create a meta-PNG, which led to the development of MNG ("Multiple-image Network Graphics"), Version 1.0 of which was released in 2001. But it did not really kick off before the expiration date of the LZW patent, two years later.

11 Animation delay is an animation property that configures the delay between the time when the element is loaded and the beginning of the animation sequence. In the late 1980s computers were "slow enough that even a 0 delay was good enough for animation; as they got faster browsers added extra delays to make old animations work correctly" (shachaf 2013).

12 As explained on the cover sheet of the GIF89a Specification report, CompuServe had decided to host an unofficial directory for voluntary participation: "There will be a Courtesy Directory file located on CompuServe in the PICS forum. This directory will contain Application Identifiers for Application Extension Blocks that have been used by developers of GIF applications" (CompuServe 1990).

In terms of animation, there is another interesting side story. In 1996, a video with a 3D-rendered dancing baby went viral, in the sense that it became globally popular via email chains. Later that same year, web developer John Woodell created a highly compressed animated GIF from the source movie, as part of a demo of the movie-to-GIF process, which further enabled the spread of the Dancing Baby across the Internet (Romano 2017). This early GIF animation remains one of Wilhite's favorites (O'Leary 2013). It is also a good demonstration of the functionality of GIF's transparency, the black background of the video being removed by the conversion into GIF and therefore usable (or shareable) on any type of background. This shareability due to GIF's transparency was crucial to its success in the early days of the web and its application as Internet art. In those very same years, 1995–1996, a group of artists, among them the Russian GIF artist Olia Lialina, formed the Internet art movement, "net.art."[13] Within this framework, the GIF became an artistic practice. On a more conceptual level, as discussed below, this meant a shift from format to medium, from container to context.

WWW

According to Olia Lialina (2016b), the history of the GIF animation has nothing to do with CompuServe; it is instead a "real grassroots Net story."[14] For her, the World Wide Web (Web 1.0) was the best thing that happened to the Internet because it gave people the opportunity to program without having advanced programming skills. Net.art is a form of art that uses the World Wide Web as its medium and cannot be experienced in any other way. Hence, the importance of the browser. In Lialina's view, the GIF only exists online.

In those years, the GIF was becoming something more than just a file format; it was becoming a part of a page (a personal web page or home page, as it was called back then). As Lialina points out, "*Technically there are two features that are specific to GIFs: loop and transparency*. [One] only talks about the loop, the endless animation, a moment that exists *forever*. Transparency is about the possibility to exist *everywhere* (on any page and any background), which is historically much more important for the development of the file format into the medium." She adds: "GIF89a is a format

13 The other main members are Vuk Ćosić, Jodi.org, Alexei Shulgin, and Health Bunting.

14 In the grassroots spirit, the GIF is "a community-originated format, unlike the top-down development of emoji" (Miltner and Highfield 2017, 4). Becoming extremely popular in the 2010s, emoji originated on Japanese mobile phones in 1997.

to be distributed. The ability for one image to appear in countless contexts made it the success that it is" (Lialina 2012). Thus, for Lialina, distribution means not simply free circulation; instead, it refers more specifically to GIF's appearance (or recycling) on other home pages.[15]

This is when GIF banners became increasing popular: banner ads, "under construction" signs, flames, etc. And let's not forget the Dancing Banana! In 1996, Lialina made her first animated GIF, a black-and-white window, consisting of four frames (size: 6 KB). This GIF was a part of a page, a browser-based Internet artwork, entitled *My Boyfriend Came Back from the War* (MBCBFTW). Conceived as a "netfilm," the work is an example of interactive hypertext storytelling about two lovers who are trying to reconnect after the war. Today it is considered as "one of the most influential net art pieces of the mid nineties" (Bosma 2016).

Yet Lialina became probably more famous because of her creative use of the Dancing Girl, a little animated figure dressed in red, swinging her hips and her black ponytail. It is a found GIF (hulagirl.gif) that Lialina appropriated and integrated into new net.art works, such as the *Rhizome.org* splash-page from 1998.[16] A splash-page is an introduction page, enticing the user to explore the rest of the website, in this case inviting them to dance along with the GIF, which is flanked by two lines of copyright symbols. In Lialina's (2011b) words, it is a "free girl from a free collection dancing among copyright decoration" telling us that "information wants to be free."

When looking carefully at the Dancing Girl, one notices a black spot at the bottom right. It is a "forgotten pixel" that has been blinking incessantly ever since the original hulagirl.gif was uploaded on the World Wide Web. Why is it still there? Why did no one remove it? One could say it has become the "signature" of the Dancing Girl GIF, similar to the dancing dots in the recall GIF of Muybridge's horse-in-motion of the 2017 DNA storage experiments. But the former is not a DNA sequencing. So, where does its black dot come from? Where does the Dancing Girl come from?

Only recently, Lialina discovered that the Dancing Girl GIF was made by a retired pilot from the US Air Force, Chuck Poynter, who passed away in 2001 (Lialina 2011b). Poynter was the owner and developer of the website *Original Animation for Download*, in which he stored his GIF collection. The Dancing Girl appeared on the top of all the pages on the site, so it clearly was one of

15 For a more general discussion of GIF's free, unrestricted circulation, see for instance Uhlin (2014).

16 See http://archive.rhizome.org:8080/splash/olia/.

Poynter's personal favorites. As we can read further on Lialina's blog, she also found out that the Dancing Girl GIF was a demo animation made from VideoWorks, a black-and-white animation program for the early Macintosh of the mid-1980s. Among its sample animations, there were three dancing figures, forming the so-called Dance Fever Cast (Lialina 2011a). All three figures have been colored in and adapted to the GIF format by Poynter in the mid-1990s. Without going into too much detail, a comparison between the VideoWorks Dancing Girl and the GIF version shows that Poynter not only removed two frames but also got rid of the shadow. One might guess that the "forgotten pixel" is an un-removed piece of the girl's shadow—in fact, it shows up only in frames 3 and 7, which are those with the most extended shadow area in the VideoWorks file. But this hypothesis does not hold: a close-up frame-by-frame analysis reveals that the "blinking dot" is outside the shadow area.[17]

To date, it is still a mystery where the pixel comes from. But it has become the authenticity marker of GIF 1.0, a trace of its original "error-laden" style, its "DIY aesthetics" (Kane 2016, 59). The dot belongs to the format's history, to its dancing appearance in the good old days of the WWW, for which it is cherished, if not fetishized, by net artists and archivists. But there is more at stake than pure nostalgia; it is a form of resistance against the "progressive rationalization of aesthetics" in contemporary media culture (Kane 2016, 52). The dot is a critique of digital cleanness. Do not dare to remove it!

GIF 2.0 and Its Multiple Uses

By 2005, two years after the LZW patent had expired, GIFs became outdated. No serious web designer would use animated GIFs any longer. But it is precisely during that period that social networking sites were gaining in popularity. MySpace was founded in 2003, with Facebook following in 2004, Twitter in 2006, and, most importantly, Tumblr in 2007. Supporting the format since its foundation, Tumblr played an important role in GIF's revival, its combination of microblogging and built-in virality through reblogging leading to an increase in the circulation of GIFs. Twitter and Facebook have supported animated GIFs only since June 2014 and May 2015, respectively.

So, GIF 2.0 is a relatively recent phenomenon. Compared to GIF 1.0, it is more diversified in terms of style, form, and function. On social media

17 Such an analysis has been carried out by Lialina's husband and collaborator Dragan Espenschied (Lialina 2011a) as well as by the person behind the Real_Dancing_Girl (2013) creation.

sites, it has mainly become a communication tool, characterized by polysemy, decontextualization, flexibility, and repetition (Miltner and Highfield 2017). There are also many new forms of GIF art, ranging from Scorpion Dagger's humorous, sacrilegious work to Lorna Mills's low-res GIF collages and Bill Domonkos's sophisticated black-and-white cinemagraphs (Tanni and Verini 2016). Another noteworthy case is the Valencia-based collective Sal Viral, consisting of two young women, Alicia Adarve and Regina Rivas, who are net archivists/activists and meme researchers. In 2016, they made an installation with the multiple appearances of the so-called Confused Travolta GIF, combining a barcode-like sliding door, a video compilation of 220 GIFs and printouts of GIF encoded files.[18] Ripped from Quentin Tarantino's cult film *Pulp Fiction* (1994), the GIF, hashtagged with #travoltaconfused, is transparent, meaning that the living room setting from the movie scene has been removed and the cutout figure of the gangster Vincent Vega (played by John Travolta) can be stuck against all kinds of backgrounds, appearing "lost" in the most diverse situations and contexts.

The Confused Travolta GIF is a good example of a reaction GIF: "By putting a single gesture on loop [in this case of a man turning to the side with his hand out], the reaction GIF acts as a proxy for, or expression of, emotion and/or effect" (Miltner and Highfield 2017, 5). Posted on social media sites, in "reaction" to other posts, it is an effective tool of communication. Another famous example is the slowly clapping Orson Welles, extracted from the classic movie *Citizen Kane* (1941) and GIF-ized into a loop. Decontexualized, its original meaning of sincere support may be altered, ranging from an ironic to a ridiculing or begrudging clap. It becomes indeed "applicable to any situation, by anybody, regardless of their familiarity with, or awareness of, its original context" (Miltner and Highfield 2017, 5). In the early days of net culture, one could express dislike, disgust or disagreement by using the Peeman.gif (also known as peeguy.gif, peepee.gif or piss.gif). A reaction GIF avant la lettre, Peeman needed to be contextualized, instead of decontextualized. Or as Lialina (2017) put it, "Peeman can only fulfill his purpose when combined with a second image which he can pee upon."

Most of today's GIFs are video-to-GIF clips, or GIF-ized clips, which Lialina (2016b) labels "Animated JPEGs." They are made "to be posted or shared and not to become a part of a web page" (Lialina 2016a). As already pointed out, for Lialina, GIF's most important and original feature was its transparency. And that is what "Animated JPEGs" lack. In Lialina's (2016a) words, "They

18 The collective posted a short video on Vimeo, documenting the Confused Travolta installation (Sal Viral 2016).

are always a 'content', not a part of the page." This seems to imply that the GIF is making an evolution from container to context to content. But as demonstrated by the Confused Travolta GIF, things are not that simple: thanks to its transparency, Travolta's confused gesture can be placed in many different contexts (even web pages!), becoming the content of new (reaction) GIFs and as such the container of an expression.

Nevertheless, one might wonder if GIF 2.0 is not altogether a new format. Because if a format "denotes a whole range of decisions that affect the look, feel, experience, and workings of a medium" (Sterne 2012, 7), there seems to be quite a gap between GIF 1.0 and GIF 2.0.[19] Hence the nostalgia for the original format (as a web design tool) and the wave of "retro-GIF-makers" (Kane 2016, 50). For instance, the Real_Dancing_Girl is a true ode to the hulagirl.gif of 1996. With accounts on Tumblr and Twitter since April 2013, she is claiming to be an old symbol in a new look:

> I've been dancing ever since I was created back in the days.
>
> With the arise of the internet I became a vernacular symbol of freedom among the net, and a source of inspiration for countless users in the pre-history of the web.
>
> The advent of social networks brought a severe, consequently change in the aesthetic of the internet; that's why I felt the need to renew my look, giving myself a more "topical" appearance.
>
> But don't be fooled by this: my "hula" remains the same ;-)
>
> Feel free—as you've always been—to make me dance among your web universe! (Real_Dancing_Girl 2013)

The Real_Dancing_Girl is not an animated figure, but a live-action GIF of a young dancing woman, dressed in red (or blue), who swings her hips and ponytail, like the hulagirl.gif. As might be expected, the Real_Dancing_Girl GIF is transparent and below her left foot appears a blinking dot. This residue of GIF 1.0 has been deliberately added; it is an obsolete piece of technology that is nurtured for its symbolism, for its sense of freedom, for its shareability on different web pages (and backgrounds). The blinking dot disguises GIF 2.0 as GIF 1.0. A similar mechanism has been noted by Sterne (2012) in the case of the 128k standard for sound files: "A characteristic

19 This gap reflects the changing net culture, in particular the effects of Web 2.0, which meant "the culmination of approximately seven years of neglecting and denying the experience of web users—where experience is Erfahrung, rather than Erlebnis" (Lialina 2018, 178).

that might first appear as the result of numb technological imperatives is actually revealed as something that had an aesthetic and cultural function, even if it is subsequently transformed" (15).

More generally, one could say that GIF's transparency feature has been overruled by its looped animation, which was originally a browser's extension. So, is the browser still making the GIF? Lialina argues that the looped GIF is never identical, that each repetition is unique, precisely because it depends on the speed and performance of the browser (and computer) used. To illustrate this point, she made a web-based animation of herself on a swing, moving up and down, while in the location bar the URL constantly changes, switching from one address (or context) to the next.[20] Besides this technical/navigational aspect, it is also true that the loop is never the same because our viewing experience changes over the course of the loop's repetition, a point to which I will return in the final section.

To conclude the discussion of the format's loss of transparency, it seems apt to (mis)quote here Anna McCarthy's remark about GIF's to-be-looked-at-ness. She writes: "GIFs are things to look *at*, not through" (McCarthy 2017, 116). Instead of dealing with the technical spec of GIFs' transparency, she analyzes their "visual pleasure" (turning Laura Mulvey's feminist reading of classical narrative cinema into a witty critique of today's capitalist, corporate online culture), which she connects to the to-be-looked-at-ness of our smartphones. GIFs' raison d'être is to catch our attention; they impose themselves, unsolicited and unannounced, "in the indeterminate *durée* that is the flow of social media" (McCarthy 2017, 114).

Sleepless Images

GIFs are sleepless images because of their nonstop operation, their continual looping and animated presence on the Internet. According to Jonathan Crary (2013), today's human life is inscribed into duration without breaks. In his condensed study about our new 24/7 temporality, he writes: "Sleeplessness is the state in which producing, consuming, and discarding occur without pause, hastening the exhaustion of life and the depletion of resources" (17). We are living in a "time without time," or a "non-stop time," where the borders between private and professional time are dissolved, where we are supposed to be always available, day and night. While not dealing explicitly with GIFs as "24/7 feeds" (Kane 2016, 58), Crary's book

20 See http://www.todayandtomorrow.net/olia/summer.

discloses how "our productivity as workers relies on our consumption of commodities from smartphones to streaming movies to (mostly useless) information itself" (Heuer 2013). *Rhizome.org* nicely illustrates this point with an animated GIF by Zoe Burnett, entitled *Life*, which shows the repetitive action of a thumb scrolling over the screen of a smartphone.

Burnett's GIF also captures well McCarthy's point about the to-be-look-at-ness of the smartphone and the hypnotic effect of certain GIFs. McCarthy (2017) draws attention to the reproductive capacity of GIFs, in the way they accumulate layers and traces of their online circulation, that is, of their "GIFFing" (113). While circulating, GIFs acquire new meanings and literally transform (or change form). According to McCarthy, GIFs are like zombies:

> They may come back, but they're never the same. Something has changed: resolution, aspect ratio, size. Or the image material has become encrusted with memes. [. . .] Part of the enjoyment of GIFs in the context of social media involves observing their constant transformations. (114)

A case in point is, once more, the Confused Travolta reaction GIF. McCarthy, however, is attracted by different GIFs that are hashtagged with #satisfying and extracted from industrial films, showing the perfection (or precision) of machinery. These GIFs are particularly mesmerizing because of the never-ending repetition of a short flawless fragment.

This dialectics of endless shortness (or eternal ephemerality) typifies today's online loops. In this respect, Maria Poulaki (2015) distinguishes between "background loops" and "foreground loops" (92–93). The former "prolong the duration of non-action" (92), and the latter "contain a distinctive action" (93), which is however weakened by the repetitive operation of the loop. A typical example of a background loop is, for instance, the static video of fire burning in a fireplace. Most GIFs are instead, according to Poulaki, foreground loops. Yet they lose the strength of their eventfulness precisely because of the repetition of the looping:

> After multiple watching, the even superficial narrative of the event-based foreground loops is dismantled and the event itself (e.g. the visual gag) now becomes the incentive for the repetitive operation of the loop to take place. The event acquires its dynamics not from a narrative goal to be executed but from the loop's movement and self-generated dynamics. (93)

Above we have seen that, technically speaking, each repetition of an animated GIF is unique. Here we can add that the loop is never the same

because the viewer's experience also alters. That is, the sameness changes through repetitive viewing. Such a shift in viewing experience happened, for instance, to Arild Fetveit (2018), who narrates how the incessant looping of the black-and-white Sexy Prince GIF turned the flirtatious pop star into an automaton. Circulating widely after Prince's death in April 2016, this particular GIF proved itself "effective in providing a passage, not merely from the dead towards the living, but as much, from the living towards the dead" (Fetveit 2018). The split between life and death is somehow reinforced by the zooming in from medium shot to close-up, which interrupts, at each repetition, the perfect loop.[21]

In her analysis of online loop cultures, Poulaki calls attention to the looping point, or "short-cut," as she calls it, which makes the endless loop intermittent. She writes: "This looping point is a moment of reflexivity, where the present reflects the past and becomes again a new starting point, in a continuous feedback between the present and the eternal" (2015, 94). It is this continuous feedback, this repetition of the looping point, that constitutes the essence of the GIF as gesture, or—to say it with Walter Benjamin—as "creative innervation" (2005, 204). In the original version of his famous Artwork essay (1936), Benjamin observed that the decay of aura in art is matched by a huge increase of room-for-play (*Spiel-Raum*), especially in and thanks to film.[22] He also suggested to explore "the great law that presides over the rules and rhythms of the entire world of play: the law of repetition" (2005, 120). The GIF as repetitive sequence of images fits Benjamin's definition of play rather well. For Poulaki, the loop is indeed a form of play; it is a "play with self-reference, as its duration is created through self-multiplication" (2015, 94).

From sleepless to playful image, the GIF allows, lastly, for a connection with 19th-century optical toys, which were also based on the looping principle: in particular, the thaumatrope, the phenakistiscope, and the zoetrope were rotating *dispositifs* that produced repetitive "pre-GIF" visual patterns. The loop was inscribed in the circular form of their *dispositif*: the thaumatrope's circular cardboard, the phenakistiscope's disk, and the zoetrope's drum. It therefore comes as no surprise that these 19th-century visual patterns are nowadays turned into GIFs. They are literally awakened to become sleepless images among their 21st-century companions, eternally put into rotation without the need of manual operation. What is more, the content

21 The "Sexy Prince GIF" can be found on *Giphy*: https://giphy.com/gifs/justin-prince-26AHrsRVKw5lDjRba.

22 For an in-depth discussion of Benjamin's notion of *Spiel-Raum*, see Hansen (2004).

of the optical device is now its format (GIF), which runs without its original *dispositif*.

Conclusion

It is fascinating to see how a bitmap image format with a limited color palette, introduced more than 30 years ago, is surviving and thriving in the 21st century and how it challenges our notions of format (or container), medium (or context), and image (or content). As I have suggested throughout this chapter, the GIF can best be considered as a tool. It used to be a tool for programming, for creating your own animations as web designer or net artist, while nowadays it has become a tool for animating JPEGs, for looping short video clips ripped from existing movies or TV shows and for conceptualizing, theorizing, and historicizing online phenomena. As such, the GIF clearly crosses disciplinary boundaries: from information technology to art and activism, from social media and communication studies to genetics and brain science.

Moreover, the GIF epitomizes changes in our screen culture, from the desktop computer screen and Web 1.0 browsers to the cellular touchscreens through which we access—nonstop—online platforms. It is difficult to predict the future, but since reality often catches up with science fiction, it is quite possible that the human species will soon have GIFs in its brains.

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