**Interview Florian Cramer – Floppy Disk Fever**

**Florian Cramer (NL)** is a practice-oriented research professor in 21st Century Visual Culture at the Willem de Kooning Academy in Rotterdam, the Netherlands. Since 2009, he has taken up the habit of creating and distributing films using floppy disks and has conducted multiple workshops around the subject. By employing extreme measures of compression he was able to squeeze entire movies on the 1.44 Megabyte provided by the medium. The floppy disk also stood at the center of several of his collaborative film projects, as a vehicle for collective constraint. We ask him about the methodology behind his work and the potential of the floppy disk as a contemporary experimental medium. What’s the link between combinatorial poetics and ‘floppy life cinema’?

**Hello Florian, we're very glad you could find the time for this interview.**

It's always a pleasure, especially when it's on the subject of floppy disks.

**We would like to start by asking you about your background. How would you describe yourself?**

That’s actually quite a difficult question. Formally I'm a professor at the Willem de Kooning Academy and the Piet Zwart Institute in Rotterdam. In the Netherlands, we have this particular construction of so-called practice-oriented research at art schools. My job is to look at the developments and changes of the overall field of arts and design to help making sure that we as an art school are not teaching the art practice of the last century. My focus is on self-organized and DIY forms of artistic practice and what we can learn from them. That, of course, has a lot to do with floppy disks.

**We would like to know more about this link between DIY practices and floppy disks. Is this relationship something contemporary or has it always been there?**

Well, the floppy disk was originally invented as a business technology, for business computers and business data exchange, but later it became intrinsically linked with the history of home computing. After audiocassettes it was the first affordable storage medium for home computers in the eighties and nineties.

**Did your personal relationship with floppy disks also start back then?**

Absolutely, I first got in touch with home computers in 1981 or 1982.when I was 12 or 13 years old. That was the time when the very first affordable home computers became available in Europe. My first home computer was the Sinclair ZX81. You could call it the great grandfather of the Raspberry Pi, because of its unrivaled low cost (of 140 Euro if we adjust for inflation between 1982 and 2020) and simple construction. This was a breakthrough, although the computer couldn’t do very much. It was essentially a programmable pocket calculator that could be connected to a screen and which could also display text and monochrome pixel graphics. It had a working memory of only one kilobyte , and you needed to connect a tape cassette recorder to save and load data. You could extend with a memory with an external module from 1 to 16 kilobyte, which felt like infinite worlds and infinite space. Compare that to the 1.4MB (i.e. 1440 Kilobytes) of the floppy disk!

**That’s at least 87,5 times the memory. When did you start using floppy disks?**

The first computer that I had with a built-in floppy drive was the Atari 1040ST, which was low-cost knockoff of the first Macintosh computers; a very strange machine that had the same CPU as the early Amiga and the first Macintosh computers. Its desktop interface was a unsophisticated knockoff of the first generation Mac, but the underlying operating system more resembled MS DOS. This machine was particularly popular with people who made music, because it was the only one that had a built-in MIDI interface at the time. You could use it for controlling synthesizers.

**Did you also use your Atari for this purpose?**

Well no, because I didn't have a MIDI synthesizer. But I did program computer-generated music in BASIC on the 8-bit computer that I had before that. This was even published on cassette tapes back in the time [including ‘The Unseen Collection’ of the Scottish art magazine *Variant* in 1989]. Still, even the Atari ST, which was a more advanced machine that resembled a contemporary personal computer, didn't have a hard drive. All programs and data, everything you loaded, everything you saved, was on a floppy disk. So I immediately got exposed to the precariousness of the medium. If there was a bad sector on your floppy disk, it just meant that your data was lost.

**Did the floppy disk feel limited, even though it was an upgrade from what came before? Did people still want more data?**

They did, there was a whole hacking culture of so-called extended floppy formatting that was huge at that time. We're talking about the late 1980s and the early 1990s. Let me explain how this worked. A floppy disk is basically a magnetic disk inside a plastic cover, right? And that is being read from and written on with a magnetic head. You could compare this to a machine that presses vinyl records. This device doesn't only play records, but it also has a needle to write them. Now, imagine that that machine would not fully stick to the standardization of an LP record, but also write onto the inside circle, where the label is. In that way you extend the capacity and playback time that is officially available. That's what most programmers did with extended formatting. They wrote code to directly control the magnetic write head and move it to parts of the floppy disk’s magnetic surface that were not supposed to be written upon. This also meant that you were running into even bigger risks of losing data.

**It seems like people tried to stretch the abilities of the floppy disk from the moment it arrived. Were there no alternatives on the market that provided more data out of the box?**

There were. Some time later I had a zip drive, which is something like a swappable hard drive that works with cartridges that look like giant size floppy disks. Those had a capacity of around 100 megabytes, which was huge in comparison to the floppy disks. The company that produced them, Iomega, was very successful with them for a couple of years. But then USB arrived. I think it was a small Israeli computer startup that had the idea of soldering flash memory directly onto a USB controller to make a USB memory stick. At the time flash memory cards for digital cameras and media players already existed, but couldn’t be plugged directly into computers.

**The floppy disk had been around for a very long time. Was USB the medium that prompted its downfall?**

I think that the first computer manufacturer that really brought upon the death of the floppy disk in the mainstream was Apple with the iMac in 1998. It was the first mainstream computer without a floppy drive. I remember when the iMac was introduced, there was a huge outcry with people asking if this computer wasn’t even practically usable since it didn’t have a floppy disk drive. You have to imagine that at that time, home networks were not common, and Internet access was too slow for anything but very small file transfers. To get data from A to B, from one computer to the other, was a huge problem. You would always use physical media for that. The floppy disk was the most common and convenient way to do this. It was like *the lingua franca* between computers. Between systems, you could take a floppy disk that was formatted and written under Windows and then open it on Macintosh and vice versa. The other thing that Apple did back in the time, besides killing the floppy drive, was killing the old connection ports of computers, the legacy interfaces. That was just as significant, because the parallel port for printers, serial ports and mouse and keyboard ports, were all replaced by USB, which had not even been developed by Apple.

**Were you concerned by this development?**

Not really, because I wasn't a Macintosh user. I was already using Linux around that time. Linux was always the operating system that gave you full access to all technologies. Even today you can use proprietary CD-ROM drives with non-standard hardware connections to old Soundblaster cards with Linux. It’s a hacker friendly operating system that takes really great care of supporting both new and old hardware and software standards. In that way you almost never get into a situation where you have to throw away a piece of technology just because the management of your computer or device manufacturer has decided that it has become obsolete, and stops supporting it with drivers.

**It sounds like floppy disks remained quite accessible to you, even though you did not always use them. When did they grab your attention again?**

I rediscovered the medium when I moved to the Netherlands in 2006. In January 2009 I was in Nijmegen at a festival on cassette tapes at the artist-run venue Extrapool. Some noise musicians whom I like a lot performed there, such as Peter Zincken/DJ Stront and Frans de Waard, a pioneer of Dutch experimental cassette music. I had a super cheap video camera with me, one of those first-generation no-name Chinese pseudo-HD cameras that couldn’t even focus, but had fixed-focus lenses. Back then I couldn't afford a better camera. I filmed the event, and when I looked back at the material I realized that it wouldn’t be adequate to release it on a traditional video format. What is the digital equivalent of the cassette tape? The floppy disk, of course. It has the same kind of DIY make-up.

**In what sense are they similar?**

The important thing about the cassette tape in the DIY culture of the 1980s, which I was a part of, is that it was not merely a home-made and low-cost alternative to releasing vinyls or CDs, but also a read/write medium. If you got a cassette from somebody and you didn't like it, you could just erase it and record your own music over it. The same is true for floppy disks. They were part of a swapping culture, unlike CD-ROMs, which were the mainstream media for distributing digital content from the 1990s to the earlier 2000s. Around floppy disks, there was a similar kind of exchange and piracy culture as with cassette tapes. Full disclosure: the police once busted me in the early 1990s for swapping illegal commercial software. That was my conversion to Open Source/Free Software. When I realized the similarities between cassette swapping culture and floppy swapping culture, I decided to put out my films on floppy disk.

**Floppy disks are not the first medium that comes to mind when you think about video. Were there any commercially available floppy video media in the past?**

I can think of two cases where floppy disks were historically used for video recording. The first one is the Video Floppy, which was a very short lived and very marginal format used in camcorders, developed by Canon and physically incompatible to computer floppy disks. The other exception were the Sony Mavica cameras, which were among the first generation consumer digital photo cameras produced in the 1990s. Their most clever feature was to record to floppy disks, which promised a better ease of use than the various flash memory card formats (Compact Flash, SmartMedia, xD and later SD cards) used by other digital camera manufacturers at the time. You didn’t need a card reader, but could just pop the floppy into your computer to take off the pictures. The later generation Mavicas also had a video recording function, using the MPEG-1one codec. This is the codec also used on the Video CD, which was the low-resolution precursor of the DVD. On one floppy disk, the Mavicas could record about 15 seconds of video with sound.

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**Did you also work with any of these Sony Mavica cameras?**

Yes, after I made my first floppy film at the tape event in Nijmegen, I kept finding them on flea markets for a few Euros. I now have a whole collection of them, including the very high end Mavica FD91 with a stabilized super zoom lens, the Hasselblad or Arri Alexa of floppy disk cameras. I started to give some of them away and used them in a couple of my workshops. In 2009 I recorded a concert by the Norwegioan eight-bit band Next Life in WORM. There's two really great features in all Mavica cameras. First, their floppy drives run at double speed. They read and write the data twice as fast as a normal computer floppy disk drive. Secondly, they have a built in floppy disk copy function. The camera has an internal 1.4 megabyte memory buffer which allows you to make copies of any floppy disk inside the camera, not only those recorded with the camera. For this concert, I had bought a whole package of floppy disks. Once I had recorded my 15 seconds video during the concert, I made copies of the floppy disk on the spot and handed them out to the visitors while the band was still playing. I called it ‘Floppy Live Cinema’, paying hommage to the Live Cinema movement started by Martijn van Boven and others at WORM a couple of years earlier. So you can use the Mavica camera as a performative medium and have this immediate social experience of swapping and sharing the floppy disks.

**You could say that you still used the floppy cameras as they were intended here. However, later you also started to stretch the possibilities of the floppy through compression. How did this come about?**

At the time I was closely affiliated to both the Media Design program at the Piet Zwart Institute and WORM. The first and second generation of students that I taught at Piet Zwart Institute founded the moddr\_ lab at WORM, a DIY media space. Moddr\_ ran a number of community programs, including a pirate cinema event on the night of the Oscar ceremony. The idea was that people should bring BitTorrent files - not the downloads themselves, only the files with which you can start a BitTorent download -, of the Oscar nominated films. I thought: Okay, that's a challenge for me. I should try to get all the Oscar nominated films on floppy disks, one film per floppy and at full length, not just a few seconds or a few minutes.

**How did you manage?**

I ended up using animated GIFs. If you have a GIF with a resolution of five by three pixel, and a reduced frame rate, something like four frames per second, you can fit an entire feature=length film onto a single floppy disk. I did this on this moddr\_ film evening; each floppy disk had one of the nominated films on them, including The Wrestler and Slumdog Millionaire. But actually this was based on a misunderstanding, because I had thought that everyone needed to bring the video downloaded via BitTorrent and not the BitTorrent index file. However, this turned out to be a productive misunderstanding. moddr\_ later asked me to participate with my floppy films in their retrospective exhibition in Brussels at iMAL.

**What is the legality of these floppy pirate films? Did they get you into trouble?**

I actually wanted to get sued by Hollywood! I even created a public website, with the film titles in bold letters and the compressed files freely available for download. I really put them out in the open. If you used Google to search for the movies, you could easily find the files. Still, I didn’t get any legal reaction. Maybe somebody from the studios looked at the floppy films and decided that their five-by-three pixels were not enough reason to sue me. I was really disappointed!

**You later taught people how to do these sorts of compressions themselves, right? Can you tell us a bit more about your floppy film workshops?**

If I remember correctly, the first workshops also happened at moddr\_. Back then it was a little more complicated to achieve this kind of compression. It meant that you had to go into the gory details of encoding H.264, which is the most common video codec. It's in almost everything: Blu-ray, most of YouTube, a lot of video streaming. Basically any kind of media device that plays video today uses the H.264 compression standard. Back then it was still new and not that widespread, but it was the only type of video compression that could fit two or more minutes of video onto a floppy disk in SD resolution. There’s a very powerful command line open source tool called FFmpeg that uses the x264 codec, which is an Open sSource implementation of the H.264 codec. It's also the software that most streaming services use to transcode uploaded videos. The options that FFmpeg offered were quite esoteric and difficult, so I had to use all kinds of nerdy encoder tweaking parameters to be able to achieve high compression rates. That’s what I taught in the workshops.

**Is it easier to put long films on a floppy disk nowadays?**

It’s super easy. You now have several simple Open Source graphical tools for video encoding. For example, there is Handbrake, a user-friendly Open Source encoder that runs on all operating systems. Back in the time I had to teach people how to use Linux, how to use the command line, how to use FFmpeg’s command syntax and how to use x264’s compression optimization parameters. In most cases I needed two or three days for a workshop, like at the Transmediale festival in Berlin in 2012. There I invited the veteran experimental Super 8 filmmaker Dagie Brundert, whom you could call the queen of Super 8. We tried to fuse floppy filmmaking and Super 8 filmmaking: The workshop participant shot Super 8 film, chemically developed the film material in the bathrooms and the toilets of the festival, then digitized the material with crude means and finally put it on floppy disks. If you deal with all these processes and elements, including the materiality and the difficulties of developing film in a public toilet and transferring it to digital video with makeshift means, you encounter many glitches. You experience the same kind of materiality in the analog and in the so-called digital medium, which – upon closer view – is not actually a digital medium, because it is based on magnetic and electronic hardware, and that hardware is always analog. I think this helps you understand that this common idea of digital technology as a virtualization or dematerialization is blatantly mistaken and based in most cases on a lack of actually understanding the technology. Understanding the medium in such a deep structural way is, in my eyes, not a romantic or aestheticist endeavor. It also has nothing to do with the fine art concept of medium-specificity. But it forms the necessary groundwork for understanding technology – or an apparatus - in its larger economic, ecological and political dimensions. (In that sense, my floppy filmmaking project is much indebted to the spirit of early 1970s structural filmmaking.)

**There is also something aesthetically appealing to these glitches. These are sometimes appropriated within nostalgic endeavors, such as music video’s looking like VHS films. What are your thoughts on this?**

My own interest in the medium is not primarily in its aesthetic side, but more on the learning side it provides. By doing these workshops, the intrinsic material qualities of this particular medium or technology are really in your face and you understand how it is structured. With analogue film you can see the grain and you can see the chemicals. Now it's the same with digital technology. If I go down to the level of highly compressed data on a floppy disk, I can see all the artifacts and the technical workings – the gory inner details - of that medium. It helps to demystify the technology and understand how things work. I think the workshop helps to differentiate and complicate our notions of what we define as analog and digital, because if you look closer to the technical side, then it's not as clear cut as most people think. The same can be said for what are so called ‘old media’ and ‘new media’. The floppy disk is a wonderful example of this.

**What other virtues does the floppy disk represent?**

Well, I also find the aspect of constraint really important. That has to do with my own background. As a scholar in Comparative Literature, I wrote my PhD thesis on combinatorial poetics, from poetic Lullism in the Renaissance to the present. One of the most significant groups in this field is the French Oulipo, which I studied extensively. It was founded in 1961 by among others Raymond Queneau, a former surrealist, who was later joined by mathematicians like François Le Lionnais. The novelist Italo Calvino became a member, too. Georges Perec was maybe the most consequent and radical of all Oulipo writers. The poetics of Oulipo are based on very playful and ironic applications of mathematics and computation to literary writing. I think they are so much more clever and better than other approaches to computational arts, because they didn't buy into any positivist or new technology hype. They always treated computation in a pataphysical manner. The Oulipo poetics are based on the principle of constraint. An outstanding example of this is Georges Perec’s 300 pages novel “A Void” which doesn’t have a single occurrence of the letter ”e”. This is difficult to do as a writer, but also results in something more interesting than writing the same book conventionally.

**In what sense is using the floppy disk now such a constraint?**

The constraint of the floppy is not just its limited storage capacity. If that were the only criterium, you could also build a USB stick with only 1.4 Megabytes. Another constraint of the floppy disks is its transmission speed. It is a very slow medium. If you play audio and video straight from a floppy disk, often the pure hardware transmission rate of the disk data is too slow for real-time playback, so you get stutters, breaks, glitches, buffer problems and even buffer breakdowns. A third constraint is the unreliability of the medium. Unlike with hard disk drives (which use essentially the same electromagnetic technology as floppy disks, only much improved), there's no internal checksumming of the data to automatically ‘repair’ damaged files, and the magnetic surface of the floppy disk is not vacuum-sealed, but fully exposed. So it's easy only a bit of dust to get in, land on the magnetic surface and destroy data. These constraints are interesting to work with. This also operates against the colonialist techno-utopian idea of new technology as a search for the new frontier, an infinite expansion into new and even bigger territories. This is a very wasteful and questionable approach to computing, similar to how average cars have grown from compact cars to SUVs. I’m not saying that using floppy disks is ecologically responsible, but thinking of how to do things with limited means can have interesting results. It requires you to think more broadly about what you're doing.

**You hit upon the topic of ecology now, which closely relates to the question how we can repurpose technology we typically deem obsolete. Do you think there is a role for floppy disks in the future?**

Well, I have no idea what the actual ecological footprint of the floppy disk is, so I would strongly refrain from any statements regarding its sustainability. USB sticks must be much more ecologically reasonable, because one stick uses less plastic and metal than a single floppy disk while replacing, with its capacity, several ten thousands of them at the same time, and lasting longer on top of that. Concerning the question whether or not the floppy has a bright future, I would say it depends. For me, it’s not a means to an end. The floppy disk is a tool, a device, but not in a completely utilitarian way. It's become an experimental device that I more or less accidentally started using as such for a filmmaking project. It turned out to be an interesting challenge and device to work with, but I'm not ideologically or romantically glued to it. Flip books or receipt printers for example, are also interesting devices for media and artistic experimentation. Whether or not I continue working with floppy disks will depend on whether there's enough interesting opportunities or necessities to do so. I do have a number of floppy films that are unreleased, though.

**Are you concerned with the preservation of your floppy films? Do you think that they should be archived somewhere, somehow?**

I think it’s for other people to decide if they are valuable enough. However, it's very easy to preserve the data of a floppy disk. You can just make a disk image and start your own archive. I would encourage more use of USB sticks. I think they're now on the way of becoming endangered in the same way that floppy disks are. The industry wants you to use the so-called “Cloud”. Many people don't have personal computers anymore, but only use mobile phones. That makes it often impossible or difficult to transfer data from and to USB sticks. Still, USB sticks are one of the few media that people can freely share with no outside interference and control. In hacker terminology, you call that a sneakernet. A sneakernet isn’t made up of cables or wireless transmissions, but of people in their sneakers, their shoes, walking from A to B to copy data between computers and other devices, completely bypassing electronic networks like the Internet. The floppy disk is also a Sneakernet technology. That was really what it had been invented for. At the time other forms of networking were not widely available. I think it would be very interesting to look into Sneakernets and their potentials on a much larger scale.