On-Screen Prototypes:

Making speculative designs for and through animation

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ABSTRACT

This paper gives a short insight into the author's exhibition and book project Visual Music Design Fiction, a project that explores both adventurous and silly interconnections between sound and animation and simultaneously addresses problems within contemporary media technology. The text positions the project in relation to speculative design and design fiction, traditions that encompass design proposals that are made to critically explore technological or societal developments rather than to make commercially viable products. Further it draws lines between these and wider artist/inventor traditions. Based on experiences from the project it is being demonstrated how the craft of animation can be applied to model processes, and such work as an "expanded draughtsmanship" for the artist/inventor.

CCS CONCEPTS

Hardware ~ Emerging technologies ~ Analysis and design of emerging devices and systems ~ Emerging tools and methodologies • Human-centered computing ~ Visualization • Social and professional topics ~ Professional topics ~ Computing industry ~ Sustainability

KEYWORDS

Animation, design fiction, speculative design, draughtsmanship

1 Background

With pencil and paper humans have been able to imagine themselves as inventors. This has been done by professional artists and as part of the imaginary world children create while drawing. Among the more famous, Leonardo DaVinci's sketchbooks show both a refined draftsman and several plausible technical concepts [1]. The proposals of "the last renaissance man", Athanasius Kircher, are maybe less plausible than those of the "the original", but the singing statues and psalm composing machine that he and his illustrators presents in Musurgia Universalis (1650) are certainly inventive and amusing [2]. Fictitious machines presented mainly for amusement, have become a cartoon genre of its own rights. Among these are the elaborate chain reaction machines of Storm-P [3], Rube Goldberg [4] and Heath Robinson [5].

Figure 1: Office environment with sun-lit LCD screens

Speculative design distinguishes itself as a separate branch of the fictitious inventor tradition by adding a critical component. An early example of this critical turn is the 1960s Italian architect studios Superstudio and Archizoom Associati [6]. The latter did e.g. propose the No Stop City, a shopping centre you could live in, where all corridors looked the same, and each cubicle was as good as the other to sleep or shop in. The proposal takes traits from its contemporary architecture and drags them into absurdity, a strategy common in the critical design traditions [7]. The term design fiction has its origin in literature where it first described a

kind of science fiction that was just as much concerned with a convincing presentation of the fictional world and its props than as the narrative that went on within it [8]. Both design fiction and speculative design are today used beyond their original professional fields [7, 9], they are sometimes overlapping, and both are characterized by setting up fictional future scenarios to facilitate a critical discussion.

2 The Visual Music Design Fiction project

This project is a component of an artistic research PhD project in visual music film. It has until now been exhibited at Fredrikstad Animation Festival [8] and a book will be made as part of the final PhD submission. It originates from a document where ideas were uncritically noted down during the first part of the research. Partly inspired by being introduced to the concept of design fiction, and partly in search for some useful output of these, obviously too many, too expensive, sometimes impossible and other times just silly, ideas, it was decided to make them into a project of their own.

When taken a little bit more seriously the nature of the ideas suggested a critical perspective and could be used to bring forward some ethical discussions that should be part of the overall PhD project. Some core questions were later emphasized when editing and working on the presentation of the ideas:

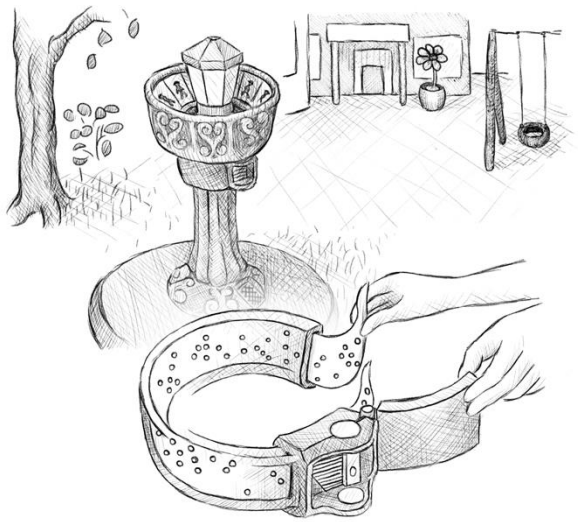

Figure 2: A combined praxinoscope and music-box

There is widespread public concern about the mode**s** of interaction we have with digital media devices, how smart phones, social media, etc. steal our time, can create an addiction like behaviour and affect cognitive functions. As animation makes up for a considerable part of the content on these devices and platforms, part of the metaphorical fuel in the machinery, it can be argued that animators share a responsibility for the eventual negative effects. How can animators then make an effort to stimulate or invent other modes of interaction with animated media?

The production and distribution of animated media is energy consuming in itself. In addition to this animated media is part of advertising financed platforms, or is in itself advertising, that stimulate energy consumption. To view the animations, you do also need devices produced through an energy consuming process and strategies in the different media and technological fields do stimulate a frequent replacement of these products. Can animated works be made in ways that to a lesser degree use non-renewable energy or provide ideas of how society and economy can be organized in less energy consuming ways?

Figure 1 shows a modern office environment where the employees work behind sun-lit LCD screens. As the back lighting typically makes up for the very most of an LCD-screen's power consumption this would reduce it considerably. Also, since the screening mechanism is weather dependent, it changes how you interact with it; it would raise your awareness of the weather, maybe also the general outdoor environment, as you would have to adapt a work rhythm closely dependent upon sunshine.

Figure 2 shows a praxinoscope – a precinematic device where animation frames are placed around the inside of a drum. An equal number of mirrors around a centre column do reflect the frames, and when the drum is rotated you can view the animation in these mirrors. Here the praxinoscope is combined with a music box mechanism underneath. As the drum is steadily rotated by a pedal, this also drives a punch card through the music box, and the composition written on the punch card is played. As the front part of the drawing shows, the punch cards are, like the animation frames, interchangeable. The device is here placed in a school yard, and both the drawing of animation frames and the composition of punch card melodies can be integrated in the school's teaching.

The different ideas presented in the project relate to many other topics than the two problems listed above. They are not presented very systematically and are seldom clearly polemic. A possible societal impact of the project must thus be viewed from another perspective: It is very hard to imagine a radically different world. It is e.g. very difficult to imagine a world where the computer, or very similar devices, do not play a massive role in the production, distribution and viewing of animation. Still, when the seminal exhibition Cybernetic Serendipity was held in 1968 the catalogue stated that computers do not yet play an important role in the arts [12]. This was stated in a highly developed culture, that already had lived through the "golden age of animation". Although alternatives certainly must exist, "the future of animation" is often imagined as a continuation of the computerization that has gone on since Cybernetic Serendipity, with e.g. the implementation of augmented reality and the application of artificial intelligence driven tools, not as shift of direction. A famous quote says: "it is easier to imagine an end to the world than an end to capitalism"

[13]. If one wants change, the obstacles are not just the practical implementations, but also the imagining of these changes. The aim of the Visual Music Design Fiction project is not the abolition of all computers, but one of its purposes is still that of disruptive utopianism; to push the viewer into a state where radically different ways of interacting with sound and animation can be imagined.

Animation, like the rest of society, is partly shaped by technological development. What media technology we will have in the future is not pre-destined. Still, taking part in the development is often not open to animators. It is rather a process exclusive to those who have the necessary knowledge, economic means or political influence. Speculative design can, as in this project, be a way for animators to take part in this conversation.

3 Animation as the modelling of a process

On screen representations of not yet existing technology in fiction film has been discussed as "diegetic prototypes" [14]. While this is a very useful term, the word diegetic points to an exclusively narrative context. We can imagine a wider term, "on-screen prototypes", that could also encompass representations of technology in other contexts, e.g. models made for studying and developing the technology.

Several definitions of animation do sit side by side without necessarily contradicting each other, such as “creating an illusion of life” and “frame by frame manipulation of film movement”. These two do emphasise respectively an experiential and a technical aspect. A definition that emphasises the qualities relevant here is “Animation is the visual modelling of a process”. A model should here be understood as something created to enable us to observe what does not yet exist, like and model that an architect makes of a non-existing building or like a mathematical model can anticipate certain qualities of a water wave caused by the impact of a certain falling rock. If such a model is made in a visual media and shows a process rather than a static situation it is animation. This definition might also be logically sound when used in the context of traditional narrative animation. One could e.g. speak about a scene where Wile E. Coyote runs off a cliff and first falls down when he realizes he does not have ground under his feet as “a model of consciousness activated gravity”. Still, the definition is probably more meaningful in a technical context.

When Leonardo DaVinci or Storm-P drew static prototypes of their inventions, we must assume that this helped them understand aspects of their different contraptions that were hard to grasp without visualization. Further on, it is easy to imagine that the drafting process must have revealed errors in their initial concepts, pipes that would obstruct the path of a pendulum or gears turning wheels in wrong directions, and that this led them into a continuous process of reimagination and revisualization. If so, the drawing process would not happen just in order to communicate the ideas, but closely integrated with the inventing process itself, and thus the inventor skills and the drawing skills could also be related. With the skills and tools of and animator this iterative process can be considerably expanded. Through animation one can visualize and help understand the evolvement of processes that are hard to make adequate mental or static representation of. Many animation tools do also provide the possibility of a 3d view of a model. With these expanded possibilities, such animation practices could be considered as an “expanded draughtsmanship” and provide the skilled artist-inventor with useful tools to develop their ideas.

In later exhibitions of the Visual Music Design Fiction project some ideas will also be presented through physical models. To prepare the development of these, animated modelling has been applied as a tool to optimize the designs. Figure 3 and figure 4 do both show devices that draw “musical epicycles”. An epicycle is a geometric figure drawn by a cyclic motion attached to another cyclic motion [15], e.g. as the figure we would get if we traced the movement of the moon as it cycled the earth while the earth cycles the sun. The pitch of a musical note is expressed in frequencies – the speed of the sound’s vibration. The relation between different musical pitches can be expressed as ratios (although in most scales and systems these numbers would only work as approximations), e.g. a fifth has a 3:2 relation and a major third a 5:4 [16]. The devices pictured here draw figures by having wheels rotate at speeds with similar ratios as those of a musical scale. With three or more wheels they can draw figures based on the same proportional relations as those present in musical chords, e.g. major and minor. Hence the naming - musical epicycles. The “bicycle spirograph” in figure 3 changes the ratio-relation through a gearing system. The spirograph does also have cardboard stuck

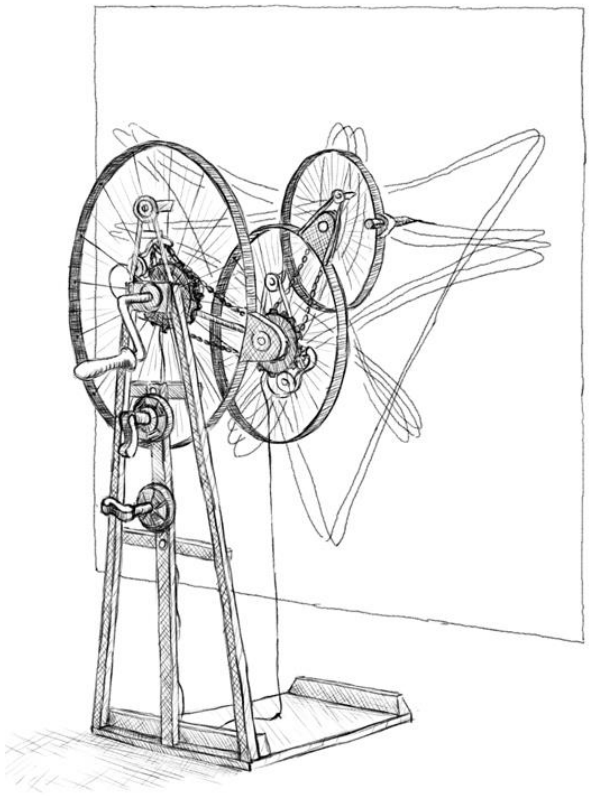

Figure 3: The Bicycle Spirograph drawing a major chord musical epicycle

between the spokes of the wheels, producing a pitched sound. Thus, both the drawn figure and the sounded musical chord will change depending on what gear ratios are set. The turntable spirograph of figure 4 has replaceable wheels that can change the ratio relation. The device does not produce a related sound, and the relation between the drawn figures and musical chords is a theoretical one. Setting up a physical model of these devices would involve a series of practical problems, some of which can be solved by animated modelling: Which combinations of wheel sizes, rotation directions and speeds result in aesthetically pleasing figures? What combinations result in figures that stays within the given frame? And what combinations will result in movements where the parts do not obstruct each other? In Adobe After Effects a circle was created and rotated around its own centre. Then a new circle was created, parented (attached) to the first and then rotated, so that it both rotated with the first circle and around its own centre. Then one more circle was created, parented and rotated. At the rim of the last circle a "pencil object" was attached, and by tracing that object one could see the resulting epicyclic figure. Depending on the sizes of circles and their rotation speed, an innumerable variation of figures could be produced. These were then aesthetically evaluated; one could observe if the pen object did move outside the frame and if the parts would obstruct each other.

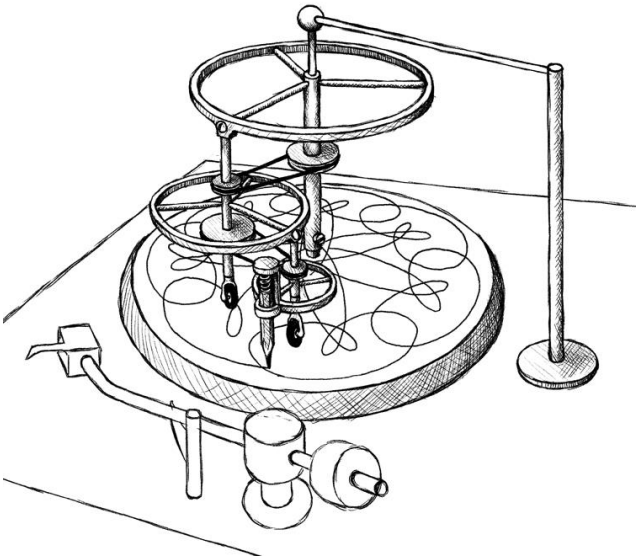

Figure 4: The Turntable Spirograph drawing a major 9 chord musical epicycle

The drawing of figure 4 was made before the animated model. It can be observed from the drawing that this design would not work, the pencil would move outside the paper, the pen would collide with a wheel etc. An animated model was needed to determine what could be possible solutions – what could be possible sizes of wheels and attachment of parts. Reiterations were done until the models did not any longer reveal flaws in the design and at the same time did draw visually interesting figures. Still on must expect that a physical model can reveal design flaws that could not be observed in the animated models, and that several reiterations must be done here too, or that one may have to return to the animated models or the drawing table. When making a physical model the typical animator skill of 3d modelling can be applied to make 3d printed prototypes.

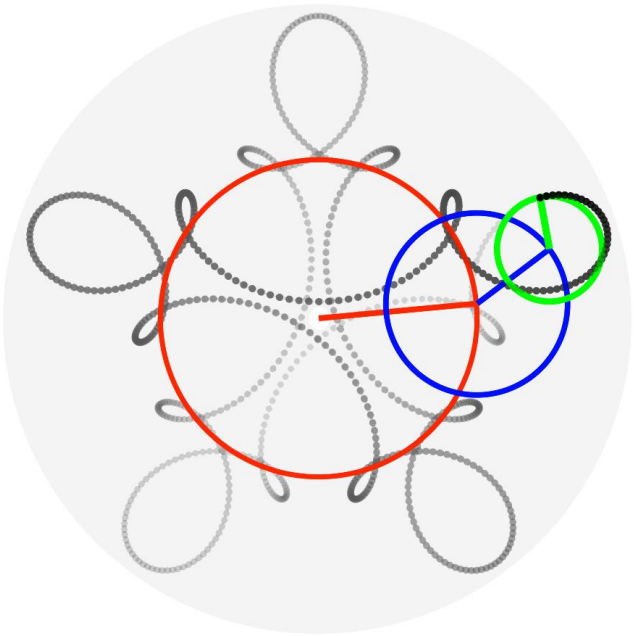

Figure 5: An animated model of the Turntable Spirograph

4 Conclusion

Traditions like design fiction and speculative design have inspired the particular art project featured in this paper to move beyond the realistically attainable and thus opened up for new ideas to solve problems within the field of animation. When making speculative design, or other kinds of artists inventions, the skill- and toolset of an animator can be used to make animated models of the designs. Such a process is here demonstrated by two devices from the featured project. Here geometric figures produced by the imagined machines first are drawn, then made by animated models, and further, through processes of reiterations developed towards the desired credible, or incredible, state. Speculative design can be a way for artists contribute to the conversation about technological and societal developments. These demonstrations shows that the skills- and toolset of an animator is suited to strengthen those contributions.

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