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THE TRUTH ABOUT DESIGNING: CONCLUSIONS FROM THE VIDEO ASSISTED LEARNING IN DESIGN (VALiD) PROJECT

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Abstract

Prescriptive models of design often consider designing to be an objective process. We show, in a study requiring two groups of student designers to produce a 10 minute film from their original two and half hour design process, how this is far from the truth. Using qualitative and quantitative analysis we suggest that accounts of designing, while focusing on key events, are determined by how those events fit (or can be made to fit) a particular story narrative. It follows, then, that the prescriptive model is simply one story about designing. We describe the VALiD methodology, a tool for detailed reflection on designing, and speculate that it could be useful in professional design contexts.

Keywords: Design Process, Digital Video, Reflective Practice

1. Introduction

Models of the engineering design process tend to objectify the process of design, often representing the process, in both flow diagrams and text, with a third person omniscient narrative [1]. Recent trends in design theory, however, originating from studies of scientific practice [2], have put far more emphasis on the constructed nature of designing [3, 4]. This approach sees the design process as a collection of differing viewpoints, often in conflict, that when taken together, better represent what actually happens during designing.

In a business context, where multi-disciplinary and often distributed design dominates, a constructivist approach would seem to have more potential for better descriptions of the design process, and hence a better basis for future learning. In an educational context, where students often lack experience in the negotiation and leadership aspects of designing [5], an ‘objective’ model of the design process can often prove useful. It is both a suitable measure for students to monitor their own progress, and an effective instrument for educators to retain the control necessary for checking this progress.

There is a discrepancy here between education and practice [6]. In the later years of education – we describe the situation at the school of Industrial Design Engineering, Delft University of Technology – as students do begin to pick up experience of designing, this discrepancy becomes increasingly acute. We assume here that other schools of engineering design lack similar development in design methodology through the syllabus.

This paper describes an attempt to reach some middle ground, describing a study in which students were encouraged to ‘construct’ their own design process. We hoped this could help them to express something that they had already begun to feel intuitively (and that recent theory has tried to argue); that designing can be experienced and described in many different

ways. Using constructivist accounts of designing [3, 4] we hoped that the students would learn that the elements of the design process can be understood and manipulated in more abstract ways to put together a coherent narrative of what happened in the design process. Here we had in mind developing a skill that is akin to 'storytelling' [7], in many ways an analytical skill creating shared understanding [8]. It is this aspect of designing that is important for students to develop if they are to extend their vocabulary and hence understanding of designing, but it is only reflection and analysis on actual processes that allow them the opportunity to develop this skill.

Recent developments in digital video have made this economically viable. Although video has been used in various capacities in design projects [9], and is now a familiar tool for design researchers [10], it has not often been used for the express purpose of crafting films within design projects. With an increasingly television and film literate student population, film-making would seem to be something of intrinsic interest to students. The burgeoning interest in television programmes showing design processes [11] has also begun to provide some exemplars for film-making designers.

Putting these three elements together – the constructed nature of designing, the need to extend students vocabulary for talking about their own design processes, and digital video as a viable medium for editing 'stories' from original footage – raises some interesting questions, both for education and research. What analytical process do students follow when constructing a design process? Which moments count as significant in a design process and why? Are students able to accurately recall what actually happened? These questions lead on to more fundamental issues apposite to designing and design theory: memory, experience, description, and prescription.

We show in this paper, by structurally analysing the editing process of the student designers, how their design experience is rationalised. We show how ideas about the 'story' of the design process originate and are developed, and also how the editing process 'airbrushes' out episodes that don't fit a particular story narrative. We conclude that digital video can be of considerable help not only in teaching students about their own design processes but, more importantly, in giving new insight for design researchers into the constructed nature of the design process, something that conventional prescriptive models, putatively scientific, tend to ignore (see for example [12]).

2. Method

2.1 Design task

Students were asked to design the packaging for a beer bottle and glass (figure 1). The packaging was to be used for a one off drinks promotion. Students were not asked to include any graphic design, but were told to focus on producing a recognisable form for the product. They were also told that the packaging should be easy to open and close, and be robust enough to carry and protect the contents. It was expected that a cardboard prototype would be completed by the end of the process.

2.2 Participants

Two groups of 4th year industrial design undergraduates from the TU Delft completed the design task. Group one consisted of 4 students (3 women and 1 man), group two consisted of 7 students (4 women, 3 men). Both groups were instructed to talk and write in English.

2.3 Materials

To carry out the design task the two groups were given plain cardboard measuring 800 x 550mm with a 3mm thickness. It was required that the final design be produced from just one such sheet of cardboard, although during the process more cardboard was available. A digital video camera and tripod were provided for the groups to record their own design activity.

In the subsequent editing phase of the project the groups were given an iMac personal computer containing the digital video editing software iMovie (figure 2). All students initially completed a small filming and editing task allowing them to become familiar with the software. A beamer was also connected as a second screen to allow large screen group viewing of video material.

Figure 1 (left) Task: Design the packaging for a beer bottle and glass

Figure 2 (right) Screenshot of the iMovie interface for the Apple iMac. The edited film appears along the bottom, with raw footage segments on the palette to the right

2.4 Procedure

The two groups were instructed to complete the design task to a working prototype within 2.5 hours. During this time the group was responsible for recording all design activity using the camera provided (figure 3). The first group simply placed the camera on a tripod for much of the design process, while the second group had a countdown timer that allowed them to switch camera-person every 15 minutes. After 2.5 hours the groups were told to stop. A debriefing session the next day was then held in which the groups watched the footage they had recorded in its entirety, while also taking notes. Following this viewing the groups were given a chance to plan how they would edit and produce their final, 10 minute, movie. They were given the simple instruction that the final movie should accurately represent what actually took place in the design exercise. Over the subsequent three days the groups, working as individuals or in pairs, put together their 10 minute movie from their initial 2.5 hours of footage. A final movie-viewing session together with questions and answers completed the assignment.

Figure 3 One student films while the others complete the design assignment

The whole process took approximately one week and formed the major part of an elective course titled VALiD (Video Assisted Learning in Design). Further, all the activity of the two groups took place in one room containing two additional remotely-controlled cameras. These were connected to monitors in a control suite. In this way all the activity of both groups – during the design and editing process – was recorded by the experimenters for further analysis.

2.5 Data

The dataset thus consists of:
1. two edited video stories (10 minutes each)
2. two recorded design processes (2.5 hours each)
3. two sets of video-tapes with footage of the editing process of the students (20 hours per set)

2.6 Analysis

The videotapes of both design exercises were transcribed verbatim, while the videotapes of review meetings and editing discussions were transcribed less fully, but with enough content to allow particular episodes to be found quickly and efficiently. Episodes strongly relating to recall or evaluation of the initial design exercise were transcribed in full.

The analytical process firstly isolated specific instances of ‘recall’ from the transcripts, secondly, looked at how these recalled memories of events compared with the actual events themselves, and finally determined how these events formed part of the larger story that the students wished to tell in their final, 10 minute movie. Concurrently with this we worked back from the segments making up the final movie to the original footage of the video exercise. Firstly locating exactly where the segments used had come from. Secondly finding evidence of the reasons justifying their inclusion. Our analysis, then, is mainly qualitative, with quantitative indications where necessary.

3. Results

3.1 Overview

The design process of group 1 lasted 2 hours 31 minutes and produced a working prototype, made out of the cardboard that was available. The design process of group 2 lasted 2 hours and 12 minutes and did not result in a working prototype. Instead the group had arrived at a final concept and drawn a completed plan on the cardboard provided. Although it was disappointing not to have seen a final prototype, the design process had really only served as a vehicle for filming the design process, with the performance of the final product being relatively unimportant to the project as a whole.

The editing process of the video data produced a film of 10 minutes 38 seconds from the original 2 hours 31 minutes for group 1, and a film of 10 minutes 50 seconds from the original 2 hours 12 minutes for group 2. Group 1 produced three separate films representing different aspects of the process (‘structure’, ‘chaos’, and ‘reality’) and simply pasted them together, while group 2 did a similar thing using two films (‘negative’ and ‘positive’). Group 1 used around 70 scenes from the original footage, while group 2 used around 40. It is interesting to note here the tendency of the groups to want to present different interpretations of the original footage, rather than providing a single account as instructed. This, of course, emphasises the constructed nature of the design activity.

The final films also included several video effects that were available in the software. This consisted of direct manipulation of the fragments: speeding up footage, slowing down footage, and removing audible conversation; as well as simple additions to fragments: background music, sound effects, and smooth transitions between scenes. Repetition of some fragments was used to effect. Title sequences and some text between fragments was also included. Although using less scenes from the original footage, the film of group 2 generally used more effects than the film of group 1, which relied more on inter-cutting from the original footage.

3.2 The structure of the final movie

Figures 4 and 5, on the following pages, give a graphical representation of how each group constructed their film from the original design process footage. The final film is shown at the top of the diagrams, divided first by story section and then by scene number. The original footage is shown at the bottom of the diagrams, scaled by time. The links between the two show how the original footage has been sampled, and ordered (but gives no indication of the length of individual samples and scenes due to space considerations).

Although the diagrams look superficially similar, this is mainly due to the graphical representation. There are a few things that are interesting to note however. The first is simply to remark on the ‘sampling strategy’ of the groups which, although broadly chronological, is certainly not regular. Indeed the ‘reality’ story of group 1 (see figure 4) which one might suppose would be almost completely chronological, is in fact the story that jumps about the most in terms of the sampling. No instructions were given to the groups as to how best to represent the design process in terms of a sampling strategy –this was one of the things we were interested in – but the way in which they have attempted to represent what happened illustrates a lot of how they think about designing.

During the review for group 2, just after seeing back their recorded design process for the first time, initial thoughts were about how time had passed and how decisions had been made. One

student commented: ‘in the beginning we felt like we had enough time, and we kept to schedule, but at the end we were out of time’. Another student, thinking about a framework for their story suggested: ‘decisions that were made to take a step forward’ drawing the comment: ‘and sometimes decisions that were made and not followed’. Here we are already beginning to see key elements of reflection on the process; the altered sense of how time had flowed, and an understanding that things might have been different. With these basic concepts the first ideas about representation using video are put forward: ‘we can speed [up the film] because in the beginning it was all kind of relaxed [but] as the time passed we were really tense... so we can build up the tension through the movie’.

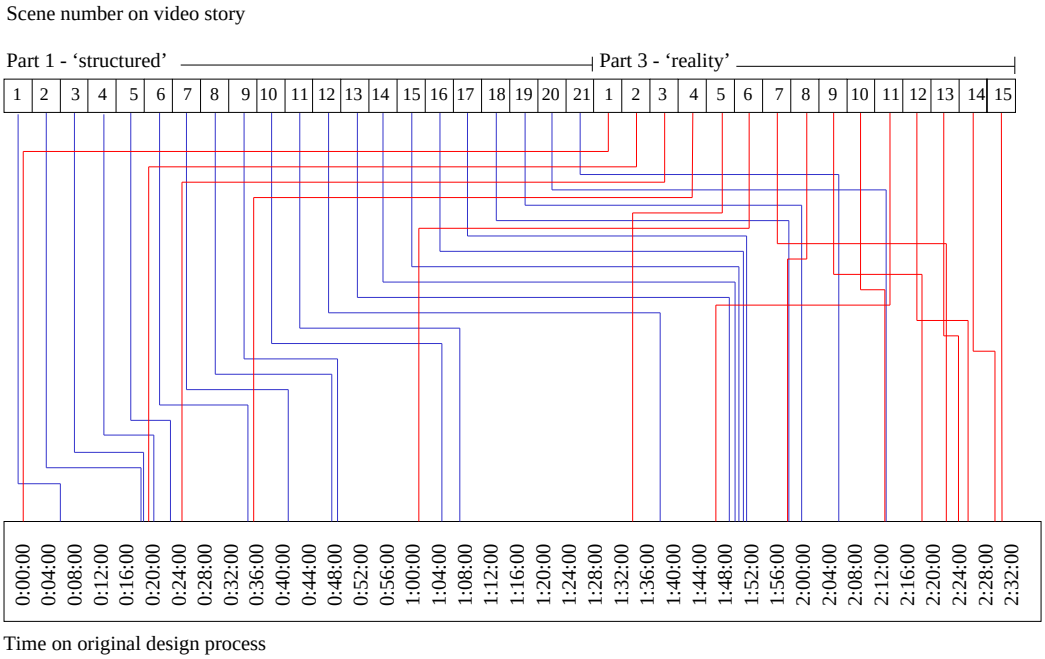

Figure 4 Group 1. The links show the samples from the original film data (bottom) used in the final film (top). Note that the design group used the original data to tell three different stories: ‘structured’, ‘chaos’, and ‘reality’, and also that part 2 of the film ‘chaos’ has been omitted for reasons of clarity

Looking at the sampling strategies of figures 4 and 5 it is possible to discern time being squeezed and stretched. There are some moments (0:20:00 – 0:24:00, 1:48:00 – 1:52:00 in figure 4 and 1:12:00 – 1:15:00, 2:03:00 – 2:09:00 in figure 5) that appear important or meaningful, at least in the sense that there is something about these moments that needs to be shown. In contrast to this are periods where nothing is worth showing (0:52:00 – 1:00:00, 1:08:00 – 1:32:00 in figure 4 and 0:42:00 – 1:06:00, 1:42:00 – 1:51:00 in figure 5). It is clear that, in terms of a story being told, some scenes fit better than others.

Perhaps what struck some of group 2 most was how, after watching themselves designing, their perception of their design process had changed from being positive to being negative: ‘yesterday I had a good feeling during the process, but it didn’t come out on the video, it was more like, there are a lot of stupid things, we lost a lot of time… it’s a shame’. They were also surprised about how little had actually happened: ‘I wrote down all talk, no doing’, one student noted. Others disagreed: ‘I thought the process was less of a mess than I felt [directly] afterwards, so for me it was the other way around, there was more structure than I thought…’. It was this difference in perception – negative and positive – that structured the eventual movie. The group decided to make two films, ending at the same point, but showing two

different interpretations of the process. One ‘positive’, emphasising an ordered and structured process. The other ‘negative’, emphasising misunderstandings that took place, and time that was ‘wasted’.

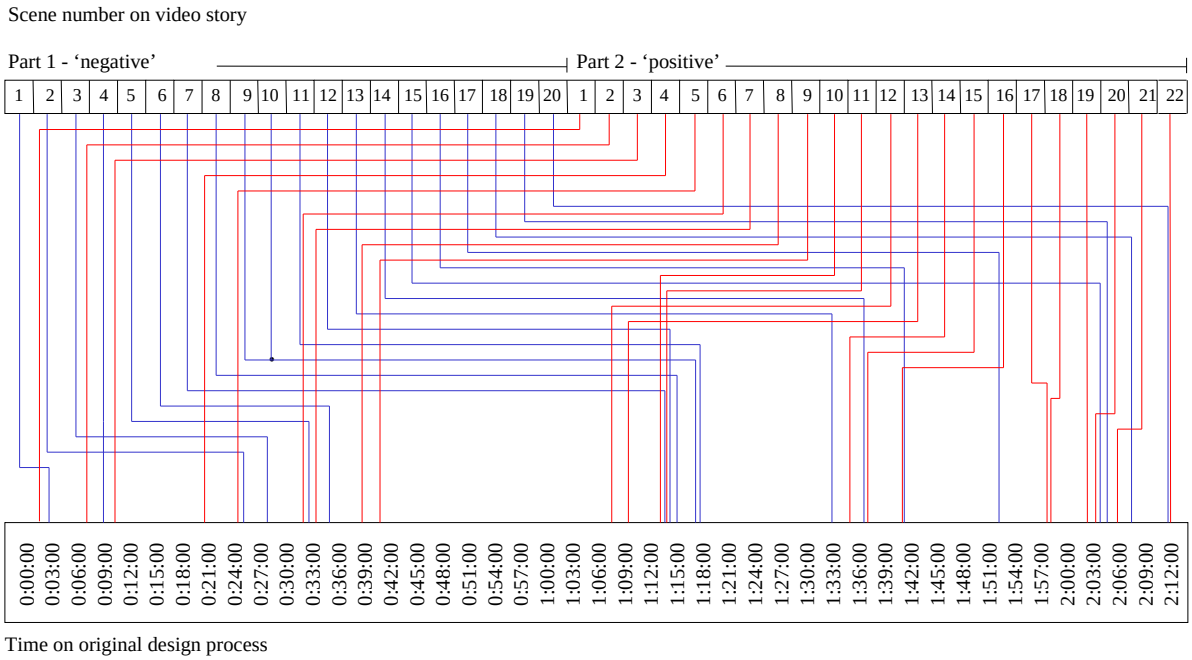

Figure 5 Group 2. The links show the samples from the original film data (bottom) used in the final film (top). Note that the design group used the original data to tell two different stories: ‘design exercise’ and ‘what if?’

The activity of finding fragments that ‘fit’ this story turned out to be less easy. While they are reviewing a fragment in which someone explains a concept they’ve come up with, one group member instructs another: ‘we’re talking about positive things if possible’, ‘is that positive?’ the other asks, ‘it’s just explaining’. Here is another dilemma for the group, assigning value to events rather than treating them as neutral experiences. By setting up a ‘positive / negative’ narrative, the group have forced themselves to judge things positively and negatively, when clearly it is often not that easy. What is interesting to note in figure 5 is how often a scene that appears in the ‘positive’ story is also used in the ‘negative’ story. One might expect that different interpretations of the process would concentrate on different sections of the original footage, but the figures seem to suggest that if a period is ‘interesting’ or ‘valuable’ it is also highly interpretable.

3.3 Re-presenting the design process

Sometimes it was not only assigning value to experiences that was difficult, but accurately recalling the experiences themselves. During the original design exercise of group 2, one of the concepts had involved the packaging having a ‘handle’, and during the editing process the subject came up again:

> “some things came out of the blue, I’ve got to give my compliments to H, because the handle is nowhere, and then suddenly, after the serving-tray discussion, the handle is a concept. We all had the same idea – gripping the bottle – and H said ‘no I like the handle’, that was the first time.”

This refers to a discussion in the original design exercise that occurred after one and a half hours. In fact there are numerous references to handles before this ‘sudden’ appearance,

several in relation to ‘wearable’ packaging – a brainstorming theme – and one specifically related to a design concept after one hour and ten minutes:

> “well ‘windows’ is just how to make it recognisable, ‘folding or breaking it’ is how to open the package… there has to be windows and there has to be a handle…”

It is true that the person, K, who thought the handle concept had been introduced suddenly, was surprised when it started to be talked about as a design concept in the original design exercise:

> H These are two concepts, one with a handle and one where you have either the bottle or the glass
>
> K I’m sorry, say that again…

It is also clear that it is this surprise that she remembers when recounting the experience, even after viewing the whole design process again. What is interesting is the way that this mistaken memory is transformed into a ‘story’ for the final movie (even the words ‘no I like the handle’ which K ‘remembers’ H saying are wrong). H’s ‘sudden’ introduction of the handle is then referred to as ‘sneaky’ by one of the other team members during the editing process, agreeing with K’s version of the events:

> W […] and the sneaky part of H, where suddenly out of the blue there’s a concept with a handle…

It is in this example that we can see the subtle play of rhetoric in talking about designing. One person’s surprise is subtly turned into another person’s sneakiness, and one can easily see how persuasive (though unconsciously mistaken) stories develop during the design process, and how a new ‘reality’ is constructed.

Sometimes the manipulations were intended, and made possible by the video medium. During the original design exercise there had come a point where one group had to choose between three concepts: a package in the form of a serving tray, a package that it was possible to twist and break, and a package with windows, like a pencil-box:

> “we have to choose each one… this you can break or whatever, the serving-tray, or the pencil-windows, we have to choose”

Because of the video narrative, which attempted to suggest ‘tension’ by showing choices having to be made between one thing and another, the choice between three concepts had to be shown as a choice between two concepts. During the editing process W explained how he achieved this ‘airbrushing’ effect to K:

> “we have this part here [segment above], but when he’s turning his head you can’t see his lips, and when he says ‘the serving-tray’ we cut it out … we had to replace it with some hiss, because otherwise you’d hear nothing, silence, we had to put some hiss in between so it sounds natural.”

In the final movie the initial fragment then becomes:

> “this you can break or whatever [hiss] or the pencil-windows, we have to choose”

A design process that was originally a choice between three concepts has been represented as a choice between two concepts. Reality has been trimmed to fit the group’s story.

4. Discussion

The video editing exercise enabled the students to reflect on the their design process and construct a representation of it. We have shown how arriving at a narrative of the process can influence how individual fragments of the process are valued and manipulated, and also how

mistaken recall of events can easily lead to mistaken agreement about someone's (sneaky) character. We have also indicated how what we have termed 'sampling strategies' tend to focus on the different interpretation of the same key incidents, rather than different narrative interpretations using completely separate incidents.

It is a short step to generalise the results from this study to experiences and accounts of everyday 'normal' design processes and this has consequences for prescriptive models of the design process. Every design process has meaningful moments, moments that seem to sum up or crystalize the process (see [13] for example, where these moments are termed 'critical incidents') and these moments are usually fitted into one narrative or another, depending on who the narrator is. Prescriptive models of designing, on the other hand, attempt to reach a definitive account of the process as a justification for the model. We hope to have shown that this view is mistaken. While prescriptive models undoubtedly achieve a political or social function – for educational or organisational purposes – in terms of the 'actual' design process they are simply the story of the professor, or the manager. By looking in detail at the editing of an actual process, one sees how flexible it is to describe and represent it, not, as one might expect, how objective it becomes.

This was above all a critical exercise during which the design groups had to develop a language for talking about the process. Rather than simply classifying the process as good or bad or, even worse, not thinking about it at all, the group were forced to appreciate the design process, and make sense of it. What was interesting was the way in which the students provided multiple 'readings' of their own design process data. As an educational vehicle the design process and video editing exercise proved successful. The feedback from the students indicated that they had received genuine insight into their design process.

There are, of course problems with the approach. Firstly, Instructing a group of students to reduce 2.5 hours of video footage to a 10 minute film is bound to produce conflicts and alternative interpretations to some degree: haven't we pre-figured our conclusions? There is some weight to this criticism, but what we had not expected was that the different narrative interpretations would circle around the same incidents. The *way* that the accounts were constructed was just as interesting as the fact that they *were* constructed. Second, the analytical process involved in transcribing up to 30 hours of video data per group proved limiting in terms of the number of groups that we could research. The data was of good quality, however, and pointed up a number of salient issues in current day design theory and research. Finally, the students were not speaking in their native language, and this may have given rise to more communication problems than is normal. It may also have caused the multiple narrative approach of the groups, concentrating especially on mis-understanding and mis-hearing. There is little that can be done in this situation, but one could argue that in many multi-national organisations this provides a better sample of design activity, not a worse one.

5. Conclusions

We have reported the VALiD (Video Assisted Learning in Design) method that enables students to effectively learn from their designing experience by editing their own design activity using digital video. The study has shown how, rather than being an objective process, as prescriptive models suggest, accounts of designing are more like making certain events fit an overall narrative. It is also possible to imagine the VALiD method being useful in professional situations, and particularly post-project design reviews.

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