

Holding Your Scream in Your Hand. 3D Printing as Inter-Dimensional Experience in Contemporary Artworks by Alicia Framis, Martin Erik Andersen and Hito Steyerl

Lise Skytte Jakobsen
Aarhus University (Denmark)
E-mail: kunlsj@dac.au.dk

Abstract. During the last couple of years, 3D printing has been widely discussed as a technology with the potential to revolutionize production methods as we used to know them. However, hitherto not much has been written about the aesthetic aspects of this new possibility of transferring bits to atoms. What kinds of (3D) images are awaiting us? This article focuses on how three contemporary artists are including 3D prints and the process of 3D printing in their work. The article offers a short introduction to the characteristics of 3D printing followed by indebt analysis of art works by Spanish installation artist Alicia Framis, Danish sculptor and professor at The Royal Danish Art Academy Martin Erik Andersen and German filmmaker and writer Hito Steyerl. The article points out how these, very different, works of art use 3D printing to offer the viewer a sense of inter-dimensionality. The central experience here lies somewhere between 2D and 3D.

Keywords: 3D printing, contemporary art, new technology and image-making, Alicia Framis, Martin Erik Andersen, Hito Steyerl.

Introduction

Those familiar with the science fiction universe Star Trek will remember the lines: “Tea, Earl Grey, hot!” A typical command from the bald captain Picard to “the replicator;” the incredible machine capable of transforming energy to mass and, in a split second, satisfy the crew’s craving for “afternoon-tea,” fish-and-chips and other intergalactic necessities of life [Fig. 1]. Still, 3D printers need something more substantial than the captain’s orders to be able to spit out objects: data and – raw materials. However, with the so-called CAD-programs (Computer-

aided design) in user-friendly formats capable of translating digital image files into three-dimensional digital models, Picard & Co.'s quotidian conjuring acts by command are not all that far-off.¹

The rapid progress within the 3D printer segment intended for the mass market is currently described by economists as the “new industrial revolution” [Fig. 2]. Amidst the swell of technological enthusiasm, however, there is still a poignant lack of knowledge about exactly what is being printed and which aesthetic problems and opportunities are likely to accompany this unique ability to turn digital data into physical objects.² You could also ask, as did the American media and image theorist W. J. T. Mitchell, which new kinds of (three-dimensional) images are likely to be realized by this technology (Mitchell 2010, 38) – Mitchell’s point being that technical innovation and new media typically give rise to an image crisis, because people generally perceive new image types to be potentially dangerous and invasive (Mitchell 2010, 38).

An obvious example from the 3D printing sphere is the debate sparked by the publication of the “print recipe” for a functional pistol in May 2013. Its distribution was due to the American crypto-anarchist and weapon liberalist Cody Wilson, who called his weapon “The Liberator” [Fig. 3]. In a YouTube clip about his political project, he says that it is “more than information, less than an object.”³ The American government immediately asked Wilson to remove the files for fear that they contravene current arms exports legislation, but at that point “The Liberator” was already safely embedded in computer memories worldwide. Hence two copies of the world’s first 3D-printed pistol have now been included in the collection at the Victoria and Albert Museum in London.

The interesting point about Wilson’s statement in the context of this article is the fact that he characterizes his pistol as being in a kind of “limbo.” As he sees it, the “dangerous” part of his project is the fact that it is more than information, but less than an object. In other words, it is an unstable product with “materialization potential.” Similarly, a number of artists have explored 3D printing as a medium exposing inter-spatial experience or inter-dimensionality. Their ends and means, however, are quite different to Cody Wilson’s, whose open-source design is intended to secure all Americans the option of carrying a gun. A feature shared by all, however, is that the 3D printer

1 E.g. www.123dapp.com. Last accessed 01. 03. 2015.

2 A few of the many new publications on 3D printing do however, partly, address the question of 3D printing and aesthetics (cf. Hoskins 2013; Warnier 2014).

3 Cody Wilson on *The Liberator*: http://www.youtube.com/watch?v=Spm_zrjedzk. Last accessed 01. 03. 2015.

is not used exclusively as a facility for producing (art-)objects, but also as a means to thematize the actual technology.

In the following, a mainly analytical approach to the works has been adopted with the aim of examining the potential of inter-spatiality and inter-dimensionality in 3D printing by specifically analysing works by the artists Alicia Framis, Martin Erik Andersen and Hito Steyerl. Using examples such as these effectively shifts the focus on 3D printing away from a purely technological production perspective to an aesthetic one. In this context, an analysis centred on the sensuous and cognitive potential of 3D printing. During the process, I will be looking to the Danish writer and linguist Per Aage Brandt's ideas about "the 2½ dimension" for theoretical support. Initially, I will outline the current status of 3D printing, starting with an exhibition on the design and production potential of the technology. The overall functional and technological perspective of the exhibition was effectively challenged by an art installation encouraging you to "scream a cup."

3D Print Technology

The exhibition *3D – Dreidimensionale Dinge Drucken (In 3 Dimensions: Printing Objects)* at the design museum Museum für Gestaltung in Zürich, in 2013, showed the type of objects and products that designers, architects, engineers, medical doctors and biologists are currently able to produce by means of 3D printing [Fig. 4].⁴ In this context, 3D printing is seen as an additive technology where extremely thin layers of material are applied on top of each other. This means that the object is created, particle by particle, according to data fed to the printer by the computer. Other types of digital production methods exist as well, which are, in effect, a continuation of various manual techniques where objects are milled or cut from specific materials using a 3D cutter on a robotic arm connected to a computer. However, it is the additive technique that is regarded as the actual breakthrough because it implies a hitherto unknown freedom in shaping and controlling specific materials.

The Spanish architect and 3D printing scientist Marta Malé-Alemany, who organized the exhibition, summarizes the risks and potential of 3D printing technology as follows: "the materialization of the digital world made possible by new fabrication tools will have a significant number of economic and sociocultural

4 The exhibition in Zürich was an adapted version of the exhibition *FULL PRINT3D: Printing Objects*, Disseny Hub Barcelona Museums, Barcelona, 2010–2011, curated by Marta Malé-Alemany. www.dhub-bcn.cat/en/exhibition/full-print3d-printing-objects. Last accessed 03. 03. 2015.

effects: we are all of us potential fabricators, we can fabricate anywhere – meaning that production is completely delocalized – and carry out our own customized fabrication. Which practically means that we are able to reinvent the world: invent it for ourselves and build it together. [...] What new forms await us? What kind of barriers will crop up on the creative horizon as a result of the shift of the digital realm into the physical world? These are exciting questions, the answers to which are necessarily speculative” (Malé-Alemany 2012a, 15).

According to Malé-Alemany (and others, see Anderson 2012; The Economist 2011), 3D printing can potentially revolutionize production methods as we know them, because it is now possible to progress from bits to atoms without having to activate and fund bulky production plant. If Karl Marx’s maxim that political power goes hand in hand with the power of production still holds good, then 3D printing technology carries within it the germ of world revolution. But, as hinted by Malé-Alemany, predicting the future is fraught with uncertainty, also where applications and proliferation of 3D printing are concerned. There are, however, a number of characteristics inherent in the technology that will decisively influence its proliferation. At the *3D – Dreidimensionale Dinge Drucken*, 2013, these core characteristics (starting with Malé-Alemany 2012b, 17–48) were thematized as follows:

- 1) No form restrictions – providing the scope for producing extremely complex geometric shapes.
- 2) Scope for variation – ten different objects are no more costly to print than ten identical ones; no one needs completely identical candlesticks.
- 3) Specialized production – 3D printing is particularly suitable for individualized products such as prostheses based on 3D scan of the user’s body.
- 4) Complexity – 3D printers can produce complex units in one production run such as interlocked links or parts embedded into hollow spaces; no need to assemble the parts later.
- 5) Material options – which are wide-ranging. The raw material could be rolls of plastic cord, but also plastic, metal, sand, wax, chocolate, rubber, or food in liquid or powder form.

As far as materials go, the scope is ever-widening, although it might be costly if you want to print in materials other than plastic. Depending on the type of printer you have access to, it is potentially possible to print in all conceivable materials from glass and metal to sugar and sand – or living cells. The latter – known in English as “tissue engineering” – is presently undergoing further exploration with a view to enable the “printing” of human organs (Anderson 2012,

95). The prospects of organ printing for real-life surgical applications are still some way off.⁵ The general point being, however, that although many people's experience of 3D-printed objects is still restricted to smallish plastic gadgets with a dubious finish, 3D printing is not limited to a specific type of material. In some contexts, you would hardly notice that the object had been printed rather than traditionally produced, i.e. cast. For the person using a hearing aid, it is likely to be of little consequence that the hearing enhancing gadget was "customized" on a state-of-the-art 3D printer. 3D printing is not, therefore, necessarily significant for one's immediate *experience of material and materiality*.⁶ In other cases, 3D printing technology will be the decisive factor in the perception of an object, for the development of new combinations of form and material, and for making new inroads into knowledge. This is true of innovative design as referred to by Malé-Alemany or, as we shall see, critical positions in contemporary art.

Alicia Framis: *Screaming Room*

The Spanish artist Alicia Framis's installation *Screaming Room* (2012–2013) [Figs. 5–7] from the exhibition *3D – Dreidimensionale Dinge Drucken* posed a challenge to the impressive and contagious enthusiasm surrounding technology at the imminent prospect of new refined and complex design forms and production methods brimming with ideas of freedom and flexibility imagined by their pioneers. In comparison, her use of the 3D printer appears basic and tangible, perhaps even deliberately naïve in all its simplicity, since the "product" merely consists of a series of incredibly wonky plastic cups. This was a glaring contrast to the technically and aesthetically sophisticated – and mostly useful – design seen at the exhibition.

With *Screaming Room*, Framis encourages visitors to enter a soundproof box, activate a button and – when the light inside the box flashes – for four seconds, scream as loudly, shrilly, quietly or wildly as they can. The scream is then transformed by some specially designed software into a unique 3D object by means of the 3D printer connected. The basic form is a common white plastic cup familiar from coffee vending machines and so common to us that we hardly

5 In connection with the exhibition *3D: printing the future* at the Science Museum in London, the museum asked experts to discuss eight widespread myths about 3D printing, including the scope for organ transplants using 3D-printed organs: http://www.sciencemuseum.org.uk/visitmuseum/3D_printer_exhibition.aspx. Last accessed 01. 03. 2015.

6 Here, "materiality" refers to the quality of something perceived, not the mere fact that something is a physical reality. For a distinction between these concepts see Brown 2010, 47.

notice its design. In the *Screaming Room*, this form is put through a process of distortion, and the exact design depends on your scream: the pitch, the tone, the duration. Apart from having to persuade yourself to scream in a public gallery, a significant part of the experience in *Screaming Room* is to observe the 3D printer during the 14 minutes it takes for your own sound to materialize into solid matter. Firstly, the technology is sufficiently new to most visitors that the mere fact of seeing the printer at work is fascinating. Secondly, you get a special opportunity to compare your own scream with those of others to the extent that visitors decide to leave their “sound cup” on the exhibition platform.⁷

The special thing about *Screaming Room* is that you, cup in hand, recall your scream and realize that this, in fact, is what your scream looks like. It is not only an artistic interpretation of sound – this physical object reflects *my* scream. In other words, my special sound has become an object. In my own case, this means a wavy container whose oscillation frequency effectively prevents it from ever holding water.

Afterwards, you do realize, of course, that everything depends on a software sensitive to sound waves. In this way, a three-dimensional digital model is created that the printer translates into physical form.⁸ Helped along by the printer, mediating would seem to take place between various human senses. Sound becomes a synesthetic experience, since the scream – which is measurable in time, pitch and decibels – becomes accessible as a spatial form, we can “cup” it in our hands.

The Concepts of Material “Reality” and Digital “Fiction”

Exploring the scope of digital 3D design within ceramics, the ceramic designer and assistant research professor at the Royal Danish Academy of Fine Arts, School of Design Flemming Tvede Hansen describes a similar situation as a “conflict of materials” (Tvede Hansen 2010, 122). In his case, perceived as a tension between digital design and material, exemplified by the natural qualities of porcelain (will

⁷ *Screaming Room* has been installed in different ways, please see images in the publication Alicia Framis, *Framis in Progress*, 2013, available at www.aliciaframis.com.

⁸ Other printing projects have, in similar ways, used sound to design form. In the jewellery design series *8hertz*, the English exhibition group 1234lab used the user’s/buyer’s personal voice recordings as a basis for materialization. The basic design consists of a sound-sensitive algorithm which is subsequently translated into physical form (Tvede Hansen 2010, 154). Here, too, the 3D printer “develops” a “sound-map” thereby making the audible open to the senses of touch and sight. For other examples of designs using sound, see *Cloudspeaker* and *Soundplotter* projects offering ideas on your musical taste translated into object form (Ipser 2010, 22–25).

run and settle over time) offset by the momentary character of the 3D print [Fig. 8]. The conflict is characterized by providing: “a sense that something is fictitious and something is what we might call real. [...] When we observe the artefact, we will be dashing between fiction and reality and between representation and material as such” (Tvede Hansen 2010, 122).

Describing the material as real and the digital as fictitious is the prevailing perception of the contrast between old and new media. In this context, the American literary critic and thing theorist Bill Brown talks of “the hypothesis of dematerialisation,” according to which new media exert negative influence on our ability to maintain contact with the real world (Brown 2010, 51). Here, Brown is referring to the tradition extending from Karl Marx and Max Weber to Guy Debord and Jean Baudrillard, in which the modern and the postmodern are generally characterized as a process of abstraction (Brown 2010, 50). In the context of such arguments, modern media – especially digital ones – have a dematerializing or alienating effect. In other words, they engender a loss of reality or of the idea of original reality.

Contrary to this, you could argue that 3D printing materializes the world for us, making the virtual real. That is certainly the case with *Screaming Room*. Nevertheless, Tvede Hansen’s observations of the material as real and the printed image as fictitious offer a good opportunity to consider what it is exactly that the 3D printer materializes for us. Why is the printed matter perceived as less real than “old-fashioned” rigid materials? I would venture that it has to do with our fascination of the idea that the 3D printer makes physical, real objects for us while we tend to forget the fact that it actually also produces physical, three-dimensional *images*? That is to say “something imagined,” something which, in the widest possible sense, is a representation (Mitchell 2010, 38–39).⁹ This means that the “material conflict,” as Tvede Hansen calls it, is (also) about how to characterize and perceive the three-dimensional in a figurative sense. Perhaps certain 3D prints render us especially susceptible to the gradual slide of materiality as material and texture, and materiality as three-dimensional imagery.

9 W. J. T. Mitchell has discussed and isolated the nature of an image in several contexts. The introductory definition in the short article *Image* runs: “An image is a sign or symbol of something by virtue of its resemblance to what it represents” (Mitchell 2010, 38–39). It is essential to link the idea of representation to what he writes about the character of appearance and recognition in respect of the image: “An image is always both there and not there, appearing *in* or *on* or *as* a material object yet also ghostly, spectral, and evanescent” (Mitchell 2010, 38–39).

The linguist and writer Per Aage Brandt has, in a different context, introduced the idea of the “relief stage” or the “2½ dimension,” which illustrates the potential of 3D printing to draw attention to any “material conflict” or slide in image formation. According to Brandt, the relief stage is the notion of a representational stage somewhere between the two- or three-dimensional, where perception has not been finally resolved, and where sensation remains open and explorative (Brandt 1998). Per Aage Brandt’s concept is not specifically intended for 3D printing, but evolved in connection with the play *Hvorfor bli’r det nat, mor* (*Mum, why does it get dark?*, 1989) by the theatre company Hotel Pro Forma. The audience was allowed inside in a strictly geometric stage set where singers and dancers conjured up spaces, figures and vanishing points in a way “as if floating in a world without gravity” (Bichel 1989). During the performance, the audience stood on balconies looking down and getting a bird’s eye view of a narrow, oblong space – virtually a well, in which the performers were acting and challenging one’s perception to capture a condition and a perspective between 2D and 3D. Per Aage Brandt himself describes the observation of the 2½ dimension as a “more unresolved and reflective phase of sensation” (Brandt 1998).

Martin Erik Andersen: *Etageri* (Levels)

The sensuous and philosophical qualities in the unresolved or the transient are also central to the Danish sculptor Martin Erik Andersen’s use of 3D printing. This is true, for example, of the work *Etageri* [Figs. 9–12], in which the physical prints have actually been burnt off, displaced in the process of an analogue casting technique. His dialogue with digital design remains, as we shall see, central to the overall work.

The installation *Etageri* was dedicated in June 2013 and was created as a decorative assignment for the architectural beacon Krystallen from 2011, the domicile of the mortgage bankers Nykredit. The building was designed by Schmidt Hammer Lassen architects and is situated at Kalvebod Brygge in Copenhagen. *Etageri* reaches like a fearless but delicate pedestal up into one of Krystallen’s two covered atria. From a solid, five-square-metre aluminium base plate and very high up, you can trace this delicate lanky thing, a sort of bewildered hall stand, fixing itself, from time to time, to the atrium wall with a “branch” and, finally, to the ceiling. Other branches form a resting place for rugs and knits, and aluminium casts based on 3D scans and 3D prints are placed on a number of small platforms. A cast is also placed on the base plate where your eyes initially

home in on a living tree whose crown reaches up several levels. In line with other smaller plantings, the finely leafed, exotic tree is placed in a homemade, simple, white-painted stoneware pot.

Etageri, in other words, is a materially complex work. Behind the large pot, a computer screen has even been concealed and covered in fine-meshed knits disclosing the work's website in embroidery – *Etageri's* digital universe: www.etageri.dk (last accessed 03. 03. 2015). At one and the same time, the website serves to document *Etageri*, its details and execution, and, not least, several links indicating the different directions your dialogue with this “bank decoration” may take.¹⁰

There is a further addition of several physical “work-satellites” distributed on the six levels of the building. These consist of small accumulations of planted stoneware pots, a “hall stand” complete with hangers and casts made of 3D prints. The idea is that Nykredit staff may, in principle, make use of these satellites – hang a coat on the hall stand or bring a plant pot along to their desk for the day. Hence there is a leap in terms of both scale and function between *Etageri's* design in the representative atrium, which also doubles as the local bank, and more intimate if office areas are open.

The work's 3D print casts also mediate the scales of the building as well as of the installation. The prints are based on scans of the architecture, the stoneware pots and the planting. The scan was then converted into a digital 3D model and printed. Nevertheless, what you see in *Etageri* is not the actual 3D prints, but castings of these made according to a classic so-called “direct cire perdue” technique. This is to say that the original form – in this case the 3D print – is burnt off in the casting process. On the uppermost platform of the central pedestal, you see a sketchy model of the atrium. The various decks in this area are visible and, if you look carefully, you will also notice the installation *Etageri* complete with pots and lanky structure striving upwards. The small-scale model is a scan of a hand-built model of the work. The scan was then converted into a digital 3D model which, like the other models, was printed and then cast.

In this way, the model refers directly to itself and to the architectural and artistic whole of which it is part – like a picture of the picture *in* the picture. But equally important, the figure is also an attempt at defining the significance of merging and correlating digital and analogue registers. The 3D-based cast of

10 The website includes images and information from a broad perspective of art and cultural history, nerdy details about Persian rugs, politics and philosophy, including an Aljazeera interview with the American philosopher and political activist Noam Chomsky or a wonderful clip with an American bank official singing out his enthusiasm about a company merger (<http://www.etageri.dk/v/one.html>. Last accessed 03. 03. 2015).

the atrium appears unfocused in comparison with the architecture that it reflects and in which it is placed. Krystallen is characterised by clear-cut lines and crystalline geometry outside as well as inside. Martin Erik Andersen's model of the interior of Krystallen, on the contrary, is flighty, the form is uneven, and the paint is flagrantly dripping. A form just as close to imploding or collapsing as to straightening itself up. A couple of the other 3D-print-based casts appear to have collapsed even more. The folds and forms of the surface are complex – or indistinct – and it is fairly difficult to recognize the architecture or the plants and pots forming the material framework for the 3D scans.

In Martin Erik Andersen's work with the scans for a digital 3D model, "data extraction" was an important element: instead of aiming for an exact reproduction of the structure to be made into a 3D print, a deliberate imprecision has been incorporated into the print, a series of "dead spots" or data holes, which, in prints and the subsequent casts, leave the figures "unresolved." Hints of clear-cut geometry and crystalline forms merge with soft, organic parts that have definitely not been "sanctioned" in architectural or constructional terms. The sculptures are like stills of an organic process that most certainly does not follow a predictable line of development.

Here, the casts made from digital prints trace a line from the other materials used in the installation. The knits have a porous quality full of holes and the loose ends have not been cut off, but run like unpredictable rhizomes over knits, plants and casts. Thin bamboo sticks, often carefully painted in delicate white and lilac or covered with paper from old Donald Duck comic strips, have been linked to the plant stems by fine yarns like useless flower supports. The fine woven Oriental rugs are typically frayed, worn by years of use so that they, too, appear like thread work, a kind of "connective tissue." The building's stringent materiality of surfaces in flow is, in *Etageri*, met by carefully staged hesitation. The basic structure of the work may inspire a heavenward glance, but there are plenty of alien stations along the route where the eye will have to make sense of a mass of colour, material and scale transitions.

The role of the cast 3D models seems to be one of material "condensations." According to a note about the project written by Martin Erik Andersen, both motif and process reflect the "digital thinking" which determines many of the spaces and surfaces we find ourselves in today. In the same note, he remarks: "on the positive side, you could say that the digital aspect of our digitalised surroundings offers a kind of ecstasy in relation to the elasticity between our reality space and our thinking" (Andersen). This means that the digital may be

perceived as an opportunity to experience unresolved spatiality in line with Per Aage Brandt's "relief stage," characterizing an unresolved but potent condition between the two- and three-dimensional.

In a physical sense, of course, the casts are three-dimensional. But when seen "through" the work, they appear to be reproducing an *image* of such an "inter-spatial" condition. Their condition of potential dissolution and collapse has been stretched out between traces of digital design – geometries – and the "material itself." Rather than being a dividing line between reality and fiction, as Flemming Tvede Hansen described the difference between analogue and digital forms, *Etageri* appears largely to be about making the encounter with material digitalization available as unresolved, as an inter-dimensionality to be considered a space of perceptual options – and, as such, a "reality."

Hito Steyerl: *The Kiss*¹¹

The use of 3D printing as an inter-dimensional space of options is perhaps even more explicit in the German visual artist Hito Steyerl's installation *The Kiss* [Figs. 13–16]. The work consists of a three-part video projection shot with a 3D scanner, a 3D-printed sculpture and three light boxes, each containing a written eyewitness report. The reports originate from a dramatic and ultra-violent, but also mysterious event taking place in 1993, during the war in Bosnia. On 27 February, 19 passengers were abducted from a train somewhere between the cities of Belgrade and Bar. A Serbian paramilitary unit stopped the train and led all 19 people away whereupon the train continued its journey with the remaining 1000 or so passengers. The identities of the abducted people were quickly made public, but ten years would elapse before investigations were able to prove that the captives had been robbed of their possessions, tortured and then killed and thrown into the River Drina the same day they were abducted.

The Kiss focuses on a certain detail in this tale of horror. Several witnesses have independently mentioned the abduction of a twentieth passenger. A tall, elegantly dressed black man, who has remained a mystery ever since because no one knows him, no relatives reported him missing, and no authorities have made attempts at establishing his identity. Witnesses report that he was the last person to be abducted from the train and that the leader of the paramilitary unit was

11 *The Kiss*, 2012, installation with 3 HD video projections on plexiglas screens, 2 videos on flatscreens, documents in light boxes, 3D print, display. Idea: Boris Buden, producer: Alwin Franke, realization and objectification: Hito Steyerl.

seen tapping his shoulder, kissing him, saying: “There is my brother.” Steyerl’s installation focuses on this mysterious kiss that some claim to have witnessed, but which we, in reality, cannot prove ever took place. We do not even know whether the man actually existed – perhaps the story is just a myth – but we do know that nobody made any attempts at investigating the case.

By means of a 3D reconstruction technique used by the police to recreate crime scenes, we are, in Hito Steyerl’s video, able to follow the abduction from the train. The pictures show so-called “point clouds,” meaning point readings of the material caught by Hito Steyerl’s scanner in the reconstruction. The sculptural 3D print also reproduces the situation of the mysterious kiss. Here, in the shape of a number of figures who, like sketchy pop-up models, form a rough circle. The sculpture does not spell out what actually happened – *whether* it happened, at all. The material, printed documentation, the three-dimensional “proof” of the decisive moment when the relationship between the militia leader and man no. 20 was established, appears rather like a blurred vision, as an attempt at captivating some insight “between movement and stasis, between certainty and uncertainty,” according to an essay about the work (Franke 2012). Here, the 3D print is further described as “a blur that bears the marks of time, hovering between the abstract and the figurative” (Franke 2012).

The printed abduction scene makes it possible to alternate between a very detailed reproduction of the implicated persons and their physical relations when committing the act, and a series of hollow shells and sketchy outlines signalling a considerable lack of information. At the precise moment that should have been the revealing climax of the scene – the mysterious kiss – the sculptural image, in other words, disintegrates and advances towards a highly entropic state. Here, the idea of entropy implies the degree of randomness in a system, and the 3D print in *The Kiss* could be seen as a shape veering towards structural collapse or meltdown. The sculpture is drawing close to figurative collapse. There is simply insufficient information to be distilled into a meaningful image. It becomes virtually a “data void” that, all at once, defies decoding while nudging us into attempts at exposure; the solution seems just round the corner, but nevertheless quite impossible to retain in a dimension suited to producing evidence. In *The Kiss*, the 3D print is used to materialize the missing elements, the things that defy documentation: the fatal kiss – which, in this particular war memory, illustrates how individual identities, in a split second, can change status and become eradicated when faced with acts of terror. Alternatively, how such acts may provoke a kind of mass suggestion, so that we

end up with a materialization of an approximation of people's inaccurate ideas about a given situation.

In an interview, Hito Steyerl stated that she (too) sees *The Kiss* as a general thematization of the status inherent in 3D technology as a form of representation and documentation in our present use of images. 3D reproductions of events and places influence and manipulate our perception of space and physical reality in ways that we may be unaware of. Steyerl says, "people tend to think of 3D as something that gives a more complete picture [...] But what I think it does, it gives a more complete picture of what is missing from the picture" (Steyerl 2012a). According to Steyerl, 3D is capable of pointing out to us what is *missing*. Things we can neither see nor translate into material form. An area where the "final" picture refuses to emerge, but operates somewhere between abstraction and figuration, between fiction and reality or 2D and 3D.

Inter-Dimensional Material Experience

In the same way as the works by Alicia Framis and Martin Erik Andersen, 3D printing in *The Kiss* is used to materialize and visualize a kind of zone of untouchability, an interim stage that we would otherwise have to regard as being inaccessible to sensation. Steyerl herself describes this inter-dimensional space as "2.3D" or "2.4D" in an attempt at describing a movement and a reality between 2D and 3D, "where the documentary elements become an index of the non-documentable" (Franke 2012, note 6 and Steyerl 2012b).

This thinking and rhetoric resemble the observations made by Per Aage Brandt in respect of the 2½ dimension as a "more unresolved and reflective phase of sensation" (Brandt 1998). It is worth pointing out that there is a certain amount of visual accord in the point clouds and the blurry figuration from the 3D print in *The Kiss* and the stage pictures from Hotel Pro Forma's *Hvorfor bli'r det nat, mor?* for which Brandt's text was written. The inter-dimensionality established in *The Kiss* portrays the historical space and the political past to which access is denied – knowledge that cannot be experienced. The imagery in the performance *Hvorfor bli'r det nat, mor?* may serve as a scenic perspective of this experiential dimension where perception is forced to keep the figure-ground relationship open. Further, it is worth noting the special position that this puts the viewer into. We become witnesses of sorts to the picture that can never be *resolved*.

At present, 3D printing is hailed as a revolutionizing, global extension of production facilities: now everyone is capable of producing physical things –

share things digitally and printing them physically. The analyses in this article, however, point to an alternative approach to 3D printing, namely as a medium for “material expansion of consciousness.” In the works reviewed here, 3D printing is interesting as a means to materialize or produce pictures of something which is, as yet, unresolved as form or as knowledge.

The five characteristics of 3D printing from the Zürich exhibition – freedom of form, variation, special production, complexity and breadth of material – should perhaps be extended with a sixth one about the new medium’s ability to precisely define spatial experience and cognition of inter-dimensional spatiality – certainly when it comes to the hands and mind of the artist. Sensuous experience, spatial experience and gaps in knowledge can be given form and texture in a way that retains focus not only on the physical object, but on the virtual data which created it – whether insufficient or complete. As far as I can see, 3D printing also involves material experience, which is specifically capable of connecting, in new and startling ways, to the information that created the object. A central, newly acquired quality is the scope for recognizing the processual status of the object. Not only is it adaptable to change, it is forever “volatile.” Or in the words of Cody Wilson about the 3D-printed “Liberator,” “more than information, less than an object.” And perhaps this visualization of an inter-dimensional field could more aptly be described as “*more* than information and *more* than an object.” For, although it is actually an object that I hold in my hand, it feels like a scream.

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List of Figures

Figure 1. Scene from the science fiction television series *Star Trek* showing “The Replicator.”



Figure 2. There are a lot of different 3D printers on the market. This LulzBot Taz is a so-called “open source hardware” plastic printer. Photo: www.lulzbot.com. Last accessed 03. 03. 2015.



Figure 3. Cody Wilson, ex-law student from Texas, US, with what has been called the world's first 3D-printed gun: "The Liberator." Photo: Jay Janner/Austin American-Statesman, <http://photoblog.statesman.com/2013/05#sthash.4F8QTVQN.dpuf>. Last accessed 03.03.2015.



Figure 4. Installation shot from the exhibition *3D – Dreidimensionale Dinge Drucken (In 3 Dimensions – Printing Objects)* at the Museum für Gestaltung, Zürich, 6.2–5.5 2013. Photo: Regula Bearth, © ZHdK



Figures 5–7. Alicia Framis: *Screaming Room*, 2012–2013. Photo: Lise S. Jakobsen.

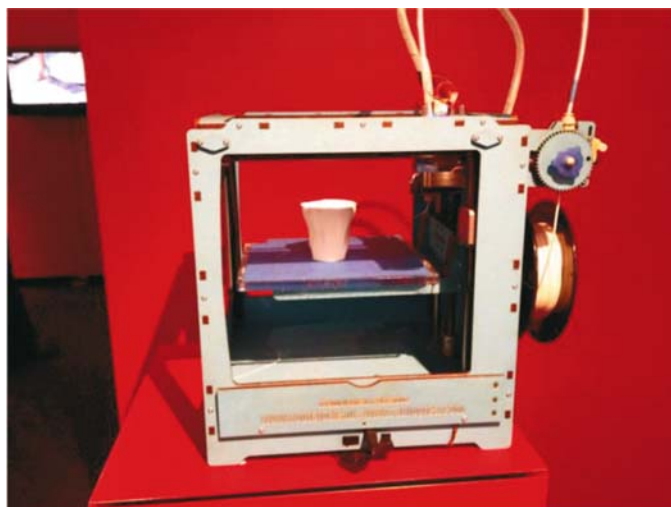


Figure 8. Flemming Tvede Hansen: *Splash*, 2007. Diameter: 42 cm, porcelain. Photo: Dorte Krogh.



Figures 9–12. Martin Erik Andersen: *Etageri*, 2013. The Crystal, Ny Kredit, Kalvebod Brygge, Copenhagen. Photo: Martin Erik Andersen.



Figures 13–16. Hito Steyerl: *The Kiss*, 2012. All images copyright of Hito Steyerl, courtesy of Portikus. Frankfurt; Wilfried Lentz, Rotterdam, photo: Leon Kahane.

