

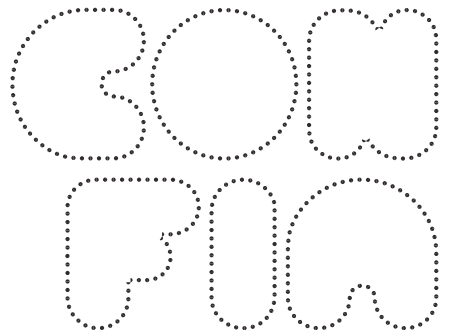
CONFERÊNCIA INTERNACIONAL  
EM ILUSTRAÇÃO E ANIMAÇÃO  
INTERNATIONAL CONFERENCE  
IN ILLUSTRATION & ANIMATION

30.11-01.12 | OFIR-PORTUGAL

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FIA

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1st International Conference on Illustration and Animation  
CONFIA • IPCA

CONFIA is the first International Conference on Illustration and Animation at the Polytechnic Institute of Cavado and Ave, organized by the Department of Design in the School of Technology under the auspices of the Masters in Illustration and Animation. It is intended to be a pivotal moment in the contemporary discussion of these areas, which have a long tradition and, at the same time, are pioneers in technological innovation. In this conference and publication we intend to broadly explore the multidisciplinary space that includes illustration and the animated image, from the construction of the narrative to character development, from art theory to critical reflection on the objects that populate the market and the industry.

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## PREFACE

### Illustration and Animation

Before beginning I should refer how honoured I am to write these words that introduce the first edition of CONFIA, international illustration and animation conference.

In Portugal, until very recently, illustration and animation based higher education courses, were very scarce and only provided by a few private universities, which offered separated programs - either illustration or animation. The MA in Illustration and Animation (MIA) based in the Instituto Politécnico do Cávado e Ave in Portugal, dared to join these two creative areas in a common learning model and is already starting its third edition with encouraging results. This masters program integrates several approaches and techniques (in illustration and animation) and integrates and encourages creative writing and critique writing. In parallel and to support the knowledge produced in MIA's context, we decided to create an international conference on illustration and animation.

As MIA (MA in Illustration and Animation), CONFIA aims to be a national and international reference in research specifically in Illustration and Animation, Drawing and Audio-visuals in general. This conference was planned to be a meeting point for specialists, artists and scholars at a global level, supported by our Scientific Committee and its recognized merits concerning artistic, academic and commercial levels in projects for animation production companies or publishing illustration for children.

The response to our call for papers was motivating, with a number of 45 selected and reviewed papers included in this publication in Drawing/Illustration, Animation and Art theory and specific sub-areas of knowledge: traditional drawing; contemporary drawing, graphic illustration; information graphics; editorial illustration, illustration for children; character design, comics & graphic novels; scientific illustration; 2D animation; 3D animation; animation for video games; character animation; animation for virtual or augmented reality; animation in interactive media; motion graphics; sound and animation; linear storytelling; creative writing; visual culture; interactive storytelling; narrative and non-narrative animation illustration and animation pedagogy and

authorship in animation or illustration.

I would like to thank the invaluable work of the Scientific Committee that supported this project since the first moment. For Instituto Politécnico do Cávado e do Ave it's an honour to organize this first conference in these emerging areas, and cultural industries, that by definition through talent and creativity, are the engine of job creation and cultural and economic wealth.

We hope that research and CONFIA contributes to find new routes for knowledge.

**Paula Tavares**

Polytechnic Institute of Cávado and Ave, Portugal

**ILLUSTRATION, AUTHORSHIP AND  
THE POLYMATH PRINCIPLE**

This lecture is based on aspects contained in two books that I have written about illustration. It concerns research, multi-tasking and authorship with a particular emphasis on the intellectual process for solving problems of visual communication.

It is a provocative thesis that celebrates the notion that an illustrator can be a polymath: a convenor of original knowledge, an authority regarding subject matter, a designer and concept originator and have a complete, esteem driven ownership for their creative practice.

**Alan Male keynote**

## CONTENT

THE MYSTERIOUS ANIMATED INVENTIONS BY ANTHONY LUCAS, OR THE EPIC OF JASPER MORELLO María Lorenzo Hernández	15
WHAT ANALYTICAL ATTRIBUTES CAUSE A SHIFT IN THE MEANING OF PERCEIVED MOTION ON THE SCREEN? Jinsook Kim	27
NEW CREATIVE POTENTIAL IN THE ANIMATION FIELD BY APPLYING UGC CULTURE A case study of the user generated animation Ai Nakajima Sadam Fujioka, Takeshi Usami, Kiyoshi Tomimatsu	37
THE ROLE OF DRAWING IN ANIMATED FILMS Sahra Kunz	51
EXISTENTIALIST BEING OF LA LINEA Nadide Gizem Akgülgil	67
LEARNING MODULE IN VIDEO MONTAGE - DRAWING AS TRANSCODIFICATION TOOL - OPTIMIZING THE LEARNING EXPERIENCE José Gago da Silva	81
DRAWING AS EXPERIENCE Marta López López	93
THE CHALLENGE OF LOOK AND READ Why Illustration communicates meaning that text is not as equipped to deliver. Susan M. Hagan	107
THE AUTHOR AND THE SELF-PORTRAIT IN ILLUSTRATION Constança Araújo Amador	125

- 137** THE OBJECT BOOK DESIGNED FOR CHILDREN  
Patricia Figueiredo
- 147** ILLUSTRATION AS A TOOL FOR THE DEVELOPMENT OF VISUAL LITERACY  
An Approach Through The Case Study Of Planeta Tangerina  
Marta Borges
- 159** GENERIC AND CERTIFIED FACIAL RIG MECHANICAL APPROACHES FOR KEY FRAME CHARACTER ANIMATION  
Pedro Bastos
- 173** STEREOSCOPIC 3D  
When watching is animating  
Cyril Lepot
- 185** THE MYTH OF THE UNCHAINED VIRTUAL CAMERA IN DIGITAL PRODUCTION  
Samuel Viñolo, Jaume Duran.
- 203** MUSERT 3D VIRTUAL MUSEUM IMMERSIBLE AND WITH CONTENT PERSONALIZED RECOMMENDATION  
Íthalo Moura, Paulo Sousa, João Lima, Francisco Neto
- 217** COMMUNICATION DESIGN AND CULTURAL TERRORISM  
using our skills to breath life into what hides in the shadows  
Bronwen Gray, Alan Young
- 231** INFORMING WITH ANIMATION  
The raise of the new language of ‘informanimation’  
Nicolò Ceccarelli
- 243** ANIMATION AND INTERACTIVITY IN GOOGLE ILLUSTRATED LOGO  
Rocio Cifuentes Albeza
- 257** ARTISTIS-DESIGNERS OF THE TWENTIETH CENTURY  
A semiotic inventory  
Marcos Rizolli

- ANIMAÇÃO 2D - A IMPORTÂNCIA DOS PRINCÍPIOS BÁSICOS **265**  
Bruno Biazotto, Vânia Valente
- ANIMATED FILMS IN THE CLASSROOM USING DIGITAL TOOLS **281**  
Three pedagogical projects  
José Rodrigues, Paulo Fernandes, Isabel cruz
- INFINITUM **295**  
Animação para a cúpula do Planetário do Rio de Janeiro – Brasil  
Cláudia Bolshaw, Luiza Novaes, Gamba Junior, Marcos Magalhães, Júlia Lacerda, Ed Schiffer, Gabriel Leitão
- ANIMAÇÃO INTERATIVA **311**  
Desafios  
Sofia Figueiredo
- “HISTÓRIAS MAL CONTADAS” **323**  
Animação para narrativas interativas, um conceito em evolução  
Rita Silva, Nuno F. Rodrigues, Jorge T. Marques
- A ANIMAÇÃO COMO SUPORTE PARA INTERACÇÃO COM O ESPAÇO FÍSICO **333**  
Sara Madureira, Nuno F. Rodrigues, Jorge T. Marques
- «SOUP ISN’T LIKE THAT, SOUP’S YELLOW» **347**  
Children’s Responses to Illustrations as a Result of their Visual References  
Gabriela Sotro Mayor
- PICTUREBOOK CONSUMPTION **359**  
A caterpillar’s cultural menu  
Ana Afonso
- RESULTS OF A STUDY ABOUT THE NARRATIVE CONSTRUCTION BY IMAGE **369**  
Miguel S. Carvalho, Nilton Gamba Jr.

- 383** WeCoOP  
A cooperative game for autistic children  
André Vilas Boas, Vitor Carvalho, Filomena Soares
- 395** WORLD OF MOVEMENT  
A Narrative Study of Moving Images for Videogames  
Blanca Pérez
- 409** SCROLLING ARCHITECTURE  
Relationships between the platformers produced  
in beginning of the 90s and Architecture  
Renata Pascoal
- 421** THE KROMOSOMER PROJECT  
Catarina Carneiro de Sousa, Heidi Dahlsveen
- 437** NEW PACE APPROACHES FOR DIGITAL STORYTELLING  
A practical case  
Humberto Neves
- 445** VÍA TANGO, A LIVELY DANCE  
Adriana Álvarez
- 459** LOOP NARRATIVES  
An Interactive Approach to Storytelling  
Sara Cunha, Adriano Rangel
- 471** O PAPEL DO ILUSTRADOR NA CRIAÇÃO DE ÁLBUNS  
ILUSTRADOS ELETRÓNICOS  
Tiago Costa Lourenço, Ana Catarina Silva, Paula Tavares
- 479** O LIVRO ILUSTRADO DIGITAL E O LIVRO  
ILUSTRADO IMPRESSO, POSSIBILIDADES DE TRANSIÇÃO  
Sara Silva, Marta Madureira, Paula Tavares
- 495** DO DESENHO TRADICIONAL AO DESENHO  
DIGITAL UM CASO DE ESTUDO  
“Wreck this Journal” vs “Wreck this App”  
Catarina Gomes, Marta Madureira, Paula Tavares
- O KANJI COMO ILUSTRAÇÃO **515**  
A sistematização do desenho em signos linguísticos.  
Flávio Hobo
- CONCEPT ART E CONCEPTUAL ART **529**  
Marcelus Senna
- CONTRIBUTION TOWARDS A **543**  
REFLECTION ABOUT METHODOLOGICAL STRATEGIES IN  
DESIGN EDUCATION AND THE FUNCTION OF DRAWING  
IN DESIGN  
Suzana Dias, Susana Jorge
- A EXPERIÊNCIA DO LIVRO ILUSTRADO **555**  
INTERATIVO PARA A INFÂNCIA  
Mariana Sampaio, Paula Tavares, Catarina Silva
- CRASH, BANG, WALLOP! **567**  
Character Design Collaboration with Children and  
Undergraduate Students  
Diane Joyce, Eleanor Wilson
- A NEW PERSPECTIVE ON THE FIRST JAPANESE ANIMATION **579**  
Antonio López
- HISTORICAL AND CONCEPTUAL LANDSCAPE **587**  
OF THE CHARACTER  
Sérgio Sequeira, Paula Tavares.
- ANIMAÇÃO HÍBRIDA INTERACTIVA **601**  
Pedro Mota Teixeira, Nelson Zagalo
- THE INFINITE PRINT VERSUS THE TANGIBLE **613**  
MEMORY OF THE ORIGINAL.  
The multipliable potential of the copy, as an ontologic discourse  
of the post-industrial era of the twenty-first century.  
Jose Antonio Castro-Muñiz

Hammerbacher

[7] Interview with Dito Manabe by CINRA.net (cinra.net/interview/2012/05/14/000000.php)

[8] “A study on the method of Metamorphosis Expression in One-frame Shooting Animation” Takeshi Usami : Works made by Strata-cut “Gluebe” (youtube/XXJVdbSjN38)

[9] “Creating 3D painterly environments for Disney’s “Treasure Planet””

Kyle Odermatt, Chris Springfield in Walt Disney Feature Animation

[10] “Using dynamic community detection to identify trends in user-generated content”

Rémy Cazabet, Hideaki Takeda, Masahiro Hamasaki and Frédéric Amblard

## THE ROLE OF DRAWING IN ANIMATED FILMS



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### Abstract

Historically, the role of drawing in traditional animation was unequivocal. How has this role been affected or changed by the advent of computer animation, and the increasingly widespread use of digital tools in animation? Can the contemporary animator work exclusively with these digital tools and forego the use of drawing, or are these tools an extension of traditional drawing utensils?

### Keywords

Drawing, Animation,  
Traditional animation,  
Computer animation

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## 1 · Introduction: Types of drawing

Drawing as art: Most commonly, drawing is perceived as being an art form in itself. We have grown accustomed to studying and enjoying the drawings of great masters. In doing so, we are recognizing that the activity of drawing consists mainly in an artistic act, whose end product is deemed to be viewed as a work of art. The artist using this type of drawing as his or her main form of expression is intent on transmitting certain mannerisms, personal aesthetic preferences and his unique form of artistic expression. This type of drawing would be best characterized using the term 'artistic drawing'. In this type of drawing, the act of drawing and the drawing produced by it are ends in themselves. The end product of mark making on a surface is similar to the marks themselves.

Drawing as a communication tool: Also, drawing can be used at a purely communicative level. This means that rather than helping to develop a concrete object, it is used to transmit ideas or concepts (this type of drawing is found in rough sketches architects, designers and filmmakers use in the early stages of the creative process - these drawings are typically very difficult to 'read' by people not familiar with their specific graphic language).

Drawing as part of the design process: The term drawing can also define the whole set of activities that occur before an artistic object is created. This necessarily implies that the type of drawing used to conceive a certain object or idea will usually be more or less hidden when achieving the final result. This type of drawing is frequently found in architectural diagrams, all forms of preliminary design sketches, storyboards in animation and live action films, amongst many others.

Both of the latter types of drawing have characteristics widely different from those found in 'artistic drawing'. They are used to develop or communicate ideas, and the end product of the process they aim and form is usually widely different from the original drawing. Drawing as a 'tool' or as a 'language' [1] constitutes an immense field of study, and can be applied to most, if not all creative fields.

In animation, all three types of drawing are relevant to the process of creation, but one can also define a fourth and final type of drawing, specific of animation: Drawing as movement: This

type of drawing exists when besides the functional types of drawing used to develop an animated film, one can also see elements of it in the final animated film. Drawing as movement implies that individual drawings are put together as frames, and create something new and different from each individual drawing. It is fundamentally different from the other three types of drawing, as it develops through time.

## 2 · Animation and drawing

Following the short definition of the types of drawing that are possible in any artistic product, it entails that different modes of drawing can and usually are used to produce an artistic product. This also holds true in animation. In this context, animation refers to the creation of a short or long film, in which the action derives either from drawing individual frames (traditional or 2D animation) or from the creation of individual frames through the use of a computer software such as Maya or Flash (3D or digital animation). Other types of animation such as stop-motion animation, mixed-media animation or animation based on rotoscoping or motion capture (MoCap) will not be discussed extensively, as at the moment they constitute a smaller body of work than the main types presented here, and the use of drawing in them varies by degrees. This does not mean that drawing is not relevant to the creation process of these types of animation, only that the specificities of its role in the creative process are clearer when comparing traditional drawn animation to computer animation.

To better understand the role of drawing in the production process of animation, one must firstly analyze the process through which an animated film is usually developed.

Many animated films start with a script or story. There are exceptions to this approach, if one considers the work of filmmakers such as Oskar Fischinger, Len Lye or Norman McLaren, who rely more on experimentation and visual abstractions than on conventional narrative. Once the theme or narrative is established, the first step of the development process is usually the production of inspirational sketches. These sketches serve to establish the general mood and feel of the characters, settings and spatial layout. In a larger studio production the task of creating the inspirational sketches is given to diverse artists, usually coming from a fine arts

background and not necessarily working in animation. This allows for a wider range of aesthetic influences and ideas, which will later on be honed down by the production team. This process is usually used both for traditional and 3D animation. In a smaller, more independent production, the artist who produces the sketches is sometimes also the animator.

Storyboarding or framing is a very critical stage of any animation production. The storyboarding process breaks down the script (whether narrative or more abstract) into scenes equivalent to those that will be seen in the final film. This process takes into account what camera moves and angles will be needed to best tell the story. In a larger studio production, specialized storyboard artists usually create storyboards. This does not happen in smaller, more independent productions. This process is used both in 2D and 3D animation, and also in live action films, and as any change during the production stage is extremely expensive, it is vital that the storyboard comes as close as possible to the final film.

Both in 2D and 3D animation it has now become more or less common practice to digitize the storyboard frames and create a timed sequence called animatic - in this moving version of the storyboard, the filmmaker will be able to visualize the timing and rhythm of the film. It is often already set to dialogues, music or sound effects.

The development of characters, if there are any, is also an important step. At this stage, many different design options can be considered, and large amounts of drawings are produced. The drawings that define the characters in a traditional animated film are somewhat closer to the to the final result that will appear in the film, although lacking the dimension of movement that will only materialize during the animation process itself. In computer animation, once the characters and their features are defined, they can be modeled in a 3D software.

An animated production also needs an artist or group of artists to develop what is known as concept art. This process can occur either at the beginning of the production, while the storyboard is still being worked on, or at a later stage, when storyboard and characters have been completed. It consists of creating a series of visual representations in color, manually or digitally painted, that give a good impression of the final look of the film. For an

individual artist working alone or with a small group, it helps to visualize how the final film will look. In a larger studio production, in which several departments can be working on different parts of the project simultaneously, it helps to maintain a unified look for the film. Following this brief description of the pre-production process of an animated film, it is relatively easy to see that drawing plays a vital role in all stages.

### **3 · Types of drawing in animation**

From the early days of animation, drawing has been a crucial tool to develop and represent both characters and stories. In traditional (2D) animation drawing is of course not only the primary tool for developing sketches, characters or storyboards, but is very close to the final visual result. Animators have an advantage if they know how to draw well, and also fully understand the possibilities and limitations of drawing as a medium. One of the most extreme examples of these drawing requirements was found at Walt Disney Studios. Animators regularly drew from life, and attended figure-drawing classes. The graphic language of Disney developed in a consistent and regimented way, and one can state that “The template for classical animation was set by Disney during its ‘golden era’, which established all the techniques for fully rendered 2D animated forms that survive into the present day” [2] The type of drawing developed at Disney evolved into a ‘template’ of sorts, emulated around the world, in which the individuality of the animators was lost in favor of a homogenized drawing style. However, regardless of the formal constraints set at Disney limiting the free expression of their animators, drawing as a technique was highly regarded, and its mastery was indispensable for any animator working there. Walter Stanchfield was one of the most notable drawing teachers of the post-war period at Disney. His lectures were recently published by Focal Press, and in the introduction to this extensive series of exercises, he emphasizes the importance of drawing for the animator: “Drawing for animation is not just copying a model onto paper - you could do that better with a camera. Drawing for animation is translating an action (in this case a pose) into drawing form so an audience can retranslate those drawings back into an experience of that action.” [3] This understanding of drawing as a means to

translate or create an action is unique to animation, as in most art, design or architectural projects created using this medium, a more static approach is usually taken. In this type of projects, drawing usually translates an object or image, and not an action or movement through time. Stanchfield's lectures were based on drawing from life, an approach that Paul Wells also condones, albeit from a different standpoint: "The emphasis on observation in drawing for animation cannot be over-stressed in the sense that it is important to draw from life, and not from an imagination that would have been already colonized by established image forms." [4] In his view, drawing from observation is even more necessary for contemporary animators, who need to detach themselves from pervasive images such as those produced by Disney, which can limit an artist's creativity and originality.

One must now proceed to question whether drawing still holds the same importance as it did in the Disney era when considering the process inherent in the creation of a 3D animated film by a large studio such as Pixar. Since the advent of computer animation, drawing would seem to no longer be the cornerstone for the creation of animation. Digital media have provided a range of tools that can assist in the creation of animation without a single drawing being produced. Still, one must consider that: "Modern technology does make it possible to be an animator without any need to draw. This cannot be denied. Even modern 2D technology enables animation of sorts, where you can draw images straight into the program without ever touching pencils or paper. In some ways, this is very desirable. (...) Can a person be an animation artist without ever being able to draw? Technically, the answer is yes. Creatively, however, I think not." [5]

At this point one also has to draw a distinction as far as digital media in animation goes: It is one thing to speak of a computer animated film, in which the process of animation can be created through templates, models and commands, but which does not require little or no drawing; and quite another to refer to the use of digital tools for drawing (such as tablets, or the more recent Inkling device by Wacom, which digitizes a drawing done on paper while it is being made). These are completely different uses of the same technology, and from the standpoint that drawing is essential to the development of an animated film, the use of

digital tools should perhaps not be viewed as being very different from the use of more traditional drawing instruments.

It is however inevitable that the role of drawing has been affected by new technologies: "Computer rendering initially pushed hand sketching towards the start of the design process, only to be used in initial ideation, brainstorming, etc. Now that the use of the computer has settled in, and the benefits and disadvantages are clear, it is time to re-evaluate." [6] This re-evaluation of the role of drawing created using digital tools is as critical in animation as in any of the other creative disciplines.

Perhaps one must perceive the role of drawing in this digital era in a twofold capacity: firstly, as a way to develop ideas (Drawing as a communication tool or as part of the design process), secondly as the means these ideas are realized and brought to the screen (Drawing as art and Drawing as movement). While the first two types of drawing are still widely used, in animation the third and fourth types of drawing are probably not as current anymore, and if they are still used, they can assume new, hybrid forms. A recent example of these new uses of drawing can be found in the Franco-Belgian animated production of *Ernest & Celestine* (2012). This short animated film is based on the children's books series created by Belgian author Gabrielle Vincent. The books featured hand-drawn watercolor illustrations, which the directors of the animated film managed to reproduce quite successfully. They did so in a way representative of the hybridization of drawing in the digital era: "We used software to animate the watercolor drawings. (...) The challenge was to reproduce her thin line drawings all at once, and the Flash technology took care of that. But mainly, the challenge was to color in the drawings to give it the look of Vincent's drawings. (...) It is interesting that we could really keep the watercolor look, and that came from the software we created for this project. It's interesting, for example, that all the animation work that Benjamin (Renner) did was polygraphic, without paper - so it is the perfect marriage of tradition and new technology." [7] The use of a digital tool such as a tablet to create drawings by hand represents the best of both worlds. The production process can be considerably sped up, through the use of computers, but the drawings retain some of the same expressive qualities a drawing made on paper would have. Director Benjamin Renner characterizes the

approach to drawing in this production: “I had already made my mind up to draw very few details and go straight to the essence, with the idea of “animated sketches” in mind that would allow us to focus on the pleasure of drawing without going back over it lots of times. We pursued an idea of free strokes; sketches with strong lines that didn’t painstakingly seek to recreate the volumes.” [8]

#### **4 · Alternate animation processes and the ‘principles of animation’**

Due to the immense task animation presents to its makers, throughout the years some attempts to simplify the process have been undertaken. Rotoscopy was the first of these processes, patented in 1915 by Max and Dave Fleisher [9]. In this process, a sequence that is to be animated is first filmed in live action, and the frames of the animation are traced over the cells of the film. The animator can choose whether he copies the filmed scenes entirely, or if he uses them as a basis for a more personal interpretation. Max Fleisher used this method to create his *Out of the Inkwell* series (1918-1929), featuring Koko the Clown. In this series, and although he makes extensive use of rotoscoping, the main character is drawn with relative freedom. This process was also used in feature films such as Don Bluth’s *An American Tail* (1986). In this story of a Russian mouse immigrated to the United States, although the animal characters were animated by hand, all the human characters were animated using rotoscoping. It can be argued that this technique saves time, but it can have some drawbacks, namely that rotoscoped characters tend to resemble the movement of humans too closely, and are difficult to integrate seamlessly with other, non-rotoscoped characters. This technique still implies that drawing is very present in the process of animating, even it is a type of drawing closer to tracing, rather than to the traditional 2D animators’ ‘drawn from scratch’.

More recently, MoCap (Motion Capture) has started being used in the creation of many 3D feature films and video games. In this process, the position and movements of a human actor wearing a special suit covered in reflective markers are recorded by an array of infra-red sensors, and this information is later transformed by a computer program into any character that the animator desires. In films such as Robert Zemeckis’ *Polar Express*

(2004) and *Beowulf* (2007) this was the main technology used. This technology also allows for actors faces and expressions to be mapped onto digitally captured movement, almost totally nullifying the need for drawings in the stages of character design. As was the case with rotoscoping, there is a fundamental difference between animation based on Motion Capture and conventional 2D or 3D animation - while the former basically translates human movement into an animated format (there may be some tweaking of this movement, but it still is its basis), the latter relies on the skills of animators who create movement from scratch.

For an animated character to be truly engaging he cannot simply mimic human traits or movements, as can be the case with Rotoscopy or Motion Capture. In the early days of Disney, a group of animators strived to create a list of traits and characteristics that would be essential for the development of a ‘good’ animated character. They were called ‘The twelve principles of animation’ [10] and have persisted largely in big studio productions as the rules to follow when creating an animated film. As with most of Disney’s work and stylistic guidelines, and because of their ‘blockbuster’ characteristics, audiences are well accustomed to seeing characters drawn with the twelve principles in mind. This has made their use a must for most larger, general public targeted films or television series. The success of an animated film in the past decades seems to stem rather from a cast of characters designed in the Disney tradition. A typical example of the use of these principles can be found in Warner Brothers’ *Roadrunner* series, especially in the character of Wile E. Coyote. Regarding only characters created by Pixar such as Buzz and Woody in *Toy Story* (1995), *Toy Story 2* (1999) and *Toy Story 3* (2010), Sully and Mike in *Monsters Inc.* (2001), Remy in *Ratatouille* (2007) or Russell and Carl in *Up* (2009) clearly stem from a long tradition of adherence to the twelve principles of animation. Another well-known example is *Scratch*, the squirrel featured in the *Ice Age* films (2002, 2006, 2009, 2012), produced by Blue Sky Studios. This character embodies most of the twelve principles of animation, almost taking squash and stretch beyond the limits of plausibility. In more independent productions these principles are usually not applied, which does in no way mean that the characters portrayed by them are not as successful as those that follow them. For exam-

ple, in Michael Dudok de Wits' *Father and Daughter* (2000) the characters have a very simply drawn traits, in a graphic language close to that of certain types of illustration. Frédéric Back, another independent filmmaker, sometimes works with very simple, almost childlike drawings (*Illusion* -1975), and his characters remain very relatable.

## 5 · Drawing practice in animation

We would claim that drawing is still (if not more) of an essential piece in the process of creating animation, and that if it is abandoned because contemporary technology allows for shortcuts in this process, the final outcome will be poorly made animation films. The question whether drawing is still relevant in contemporary animation has to be answered with a resounding yes. In the development process of animation the relevance of drawing is obvious. It is an essential tool for defining and communicating ideas, and can be irreplaceable in the creation of storyboards and characters. Besides looking at drawing as a tool, one must also look at it as a graphic style or language. This means that apart from being used to develop ideas, drawing can be a personal form of expression, visible in the final format of the film. From Windsor McCay's earliest experiments in animation with *Little Nemo in Slumberland* (1911), *Gertie the Dinosaur* (1914) or *The Sinking of the Lusitania* it has become apparent that drawing is a powerful tool to represent either whimsies of fancy such as can be seen in *Little Nemo* or *Gertie*, or to portray actual events in an extremely realistic and shocking way, as was the case with *The Sinking of the Lusitania*. In this short film (it lasts only about 8 minutes) McCay manages to convey a vivid sense of horror and realism. It is quite extraordinary how drawing, and black and white drawing as such, manages to convey such an intensity of action.

The work produced at the Disney Studios shows us the power that a realistic yet stylized type of drawing can have in capturing wider audiences. As stated before, the type of drawing practiced at Disney tended to standardize visual references, which audiences grew accustomed to, and one can argue that this 'habituation' to Disney style is in part what has made their films so popular over the years. Walt Disney took the specialization of his employees to heart: "Some artists have innate (probably optical) preferences for

small, tidy, tight characters, like beetles and chipmunks. Some run to decorative miniatures, some prefer long, limp loose contrivances like *Pluto*. To discover in each artist the caprice he best likes to draw, then to harness that specialty, is just one more example of Walt's determination to use the best available person for every task, even if he has to make that person the best." [11]

Spanning both the end of the twentieth century and the beginning of the twenty first, Studio Ghibli, under the firm leadership of Hayao Miyazaki has used some of the characteristics of Japanese drawing tradition, along with Western influences, to produce delicately drawn films such as *Grave of the Fireflies* (1988), *My Neighbor Totoro* (1988), *Kiki's Delivery Service* (1989), *Princess Mononoke* (1997), *Spirited Away* (2001), *Howl's Moving Castle* (2004) or *Ponyo* (2008). Although the style of drawing of his movies is guided by Japanese animation tradition, Miyazaki quotes animators such as Paul Grimault, Yuri Norstein or Frédéric Back as being some of his main influences. When asked in an interview whether he thought hand-drawn animation will always exist in the face of computer technologies, he answers that "There are so many ships in the animation sea that are computer driven, that I think we can have at least one that's just a log raft that we can row by hand." [12] At Studio Ghibli, drawing on paper is still the main element used in films, and very little digital effects are usually found in their films. As in most larger studios, there is a strict hierarchy and production line, but when comparing this structure to that of Disney, the main difference between Walt Disney and Hayao Miyazaki is that Miyazaki draws a lot and extremely well, and as such is an active member of the animation team. A distinctive characteristic of Miyazaki's approach is that he usually draws the full storyboards for his films himself and his drawings are what the other team members usually use as inspiration and guide for their own work.

Set in a wholly more European drawing tradition, Sylvain Chomet uses a caricatured and exaggerated drawing style to portray his characters in films such as *The Triplets of Belleville* (2003) or *The Illusionist* (2010). In BBC's 2005 documentary *The secret of Drawing*, he states about the stages of his drawing process that "The first thing is basically not to be too heavy at the beginning (...) Light drawing is essential, and then being able to imagine it,

and after that create it from imagination and not from reference. (...) The next drawing is a bit more refined than the one before. You actually put down the detail. (...) And the more experience you have in animation the less you use a computer. Well, you use it at the end, when you want to see the final details.” [13] His approach is that of a draughtsman, carefully stepping closer to the final drawing in each successive layer of marks.

Although a more ‘polished’ style of drawing can be desirable for certain types of animation, and is more frequently encountered in feature length films, in independent animation it can be abandoned in favor of a more expressive type of mark. Animators such as Phil Mulloy, Robert Breer or even Don Hertzfeldt opt to use a cruder type of drawing to represent their narrative, showing a less strict adherence to the usual ideals of representational drawing, such as different line weights or naturalism. Phil Mulloy, in his films such as *Intolerance* (2000) refers to a very rough drawing style, reminiscent of children’s drawings or primitive art. Robert Breer creates abstractions and impressions with a style of drawing evocative of sketchbooks, capturing fleeting impressions and free associations. Don Hertzfeldt drawings remind us of characters in a crudely drawn cartoon, and he often refers directly to the medium of drawing revealing the drawing surface and the pencil to the viewer (*Genre* - 1997). These are but some examples of how drawing can show multiple expressions, some of them not full of realism, and still be effective as a means of telling a story.

In computer animation the role drawing plays is more complicated to determine. It can and should be a tool in the development of animation, but it is not as close to the final product as it would be in traditional animation. This does not make it less relevant for the development process. It can be used in the creation of storyboards, character design and concept art. Without the use of drawing these processes risk being poorly developed because besides all other possible uses of drawing, if it is used as a communication tool and as part of the design process it will facilitate the elaboration of ideas. Drawing also provides for an understanding of the virtual three-dimensional object - it can fulfill both a diagrammatic (planning the space) or and a representational (creating characters and settings) function.

Recently, as far as drawing goes, Pixar has been following the

model inherited from Disney. This position is marked by Tony White, in his reference book *Animation: From Pencils to Pixels*: “Much of conventional 3D character movement still lacks that special ingredient that the best of 2D animation offers, that one organic step beyond reality that separates the artist from the technician. This is missing because the tendency of 3D animation is to ignore the observing and drawing process. Things are changing, however, principally motivated by the work of the great Pixar studio, which values drawing and the traditional principles of animation when developing personality and movement through the computer-generated medium.” [14] The need for drawing skills in the animation industry: “(...) is a heavily debated topic among stop-motion, 2D, and CG animators alike. The consensus is that everyone needs to be able to draw well. (...) Drawing helps you to think more logically and clearly about where the scene should go. Drawing helps you to see the whole picture. As visual artists, we must not take the opinion that any other art form is useless to us.” [15] In preparation for one of their feature films, *Up* (2009) [16], the development process included a field trip to the Tepuis (a type of table-top mountains) of Guyana, where a Pixar team took photographs and drew the scenery. In the “Art of” collection published by Chronicle books, a series that describes the production process of many of Pixar’s animated feature films, it becomes clear that the use of drawing is still present in the pre-production process of a 3D film. Although the drawing materials can be new, such as digital pencil or ink, most first drafts are started in conventional drawing materials such as pencil, pen, marker or watercolor. Birgitta Hosea comments on this process: “Digital technologies have led to new production processes and reproductive technologies that have changed the material basis of the medium that we call animation. Pencils and paper may have been used in the process, but contemporary drawn animation is more likely to have been created with digital materials. The virtual materiality of drawing with a computer brings into question traditional definitions of drawing. The action of drawing into a computer with a digital pen and WACOM tablet can simulate the marks that a ‘real’ pencil makes, but the mutable world of zeros and ones has a very different material basis than the residue of graphite on paper. The use of virtual materials necessitates the broadening of

conventional conceptualizations of drawing, and drawn animation, to go beyond the idea of pencil on paper and include a range of mark-making activities such as computer programming.” [17]

Many different artists provide sketches, create concept art and storyboards, and it is only in the production stage that drawing is usually abandoned in favor of digital media.

## 6 · Conclusion

It is possible to conclude that the use of drawing in animation is still essential to its success, whether it be in traditional or in computer animation. One must draw a distinction between what is considered ‘computer animation’ on one hand, and on the other of the use of digital media as tools for animation. While the abandonment of drawing in any artistic activity, and especially animation would be prejudicial, one must not deny some advantages that can come from the use of digital tools.

In the case of traditional animation, the role of drawing extends from pre-production to production, encompassing most moments in the creation of an animated film. In computer animation its role remains vital to the exploration and definition of an aesthetic and functional completion of the film, but is usually more predominant in the pre-production stage.

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5(3) 353-367