

Proceedings of the  
**Drawing Research  
Network 2013  
Conference /  
Thinking Through  
Drawing Seminar**

Teachers College - Columbia University + The  
Metropolitan Museum of Art



# Contents

Proceedings of the <b>Drawing Research Network 2013 Conference / Thinking Through Drawing Seminar</b>	<b>i</b>
Alaluusua – Sketchbooks and their private and public dimensions	1
Anderson   Isomorphology: Drawing Research and Methodology	4
Cabral   Sketching and Slow Travelling	6
Dawkins + Pable   Sketching at the Speed of Thought: Weaving Expertise Theory with Drawing Automaticity	7
Dawson   Drawing with Holoshop	17
Dos Santos   TRANSLATIONS 4a/b.2013	27
Downs   Emergent Drawing: the drawing as a complex adaptive system	36
Graham   Point, Mark, Line, Outline: Thinking Through the Drawn Line	43
Hannibal   The Digital Dilemma: Product versus Process in Architectural Education	53
Hastings   Drawing as Design Thinking: Teaching design students to think and research through drawing	58
Imperatore   Seeing More-or-Less: Drawing as Disposition of Perception	67
Justice & Williams   Motion, Light, and Space: Gesture in the Digital Age	85
Kane + Walton   Re-purposing Drawing in Textile Design Education: research and practice shaping pedagogy	94
KESKIN et al.   Drawing As An Intervention For Cognitive And Theory Of Mind Development	100
Kot   Doodling: Space, Self, Culture and Understanding	110
Lee Weider   Frederick Froebel's Influences on Drawing Education:	121
Magalhães + Providência Dreamed Gestures: A Case of Architectural Design Communication through Drawing.	126
Netter   Models for sketching in design education	132
Pelayo + Lopes   Architecting through freehand drawing	147
Price   Gesture, affect and the pursuit of the authentic.	150
Samuel   Drawing as Thinking in Chaos Theory	161
Schneckloth   Relational Gestures: Three experiments in collaborative drawing	166
Simões   Research, through and from the drawing in learning context	174
Strucke   Embodying Symbiosis: A Philosophy of Mind in Drawing	180
Wright   Exchanges between Medicine and Drawing Practice – an example of interdisciplinary dialogue	188

# Alaluusua – Sketchbooks and their private and public dimensions

## Abstract

This practice-based PhD research explores the role of the sketchbook as part of creative strategies used by artists and designers. Drawing is used as a method of investigation in the process of analysing the material from contemporary artists' interviews. Traditionally sketchbooks are seen as private spaces where artists and designers can record their ideas and work through problems; they are seen to 'reveal' the thinking of the artist making a visual record of it. In this presentation the public dimension of sketchbooks will be explored as one of the key issues that has emerged from the interview material. Focus will be on a small number of interviews out of the twenty conducted during the research. The aim is to identify and present internal and external evidence of the public dimension of sketchbooks found in the sketchbooks themselves

## Elisa Alaluusua

Elisa Alaluusua is a part-time PhD researcher at the University of the Arts London and a practicing artist and educator. Originally from a reindeer farm in Finnish Lapland she moved to England first time in 1994. Since 2000 Alaluusua has taught Fine Art at Westminster School which is a highly selective independent school in central London for 14 to 18 year olds. Her practice involves drawing and video works (see [www.ealaluusua.com](http://www.ealaluusua.com)). Since 2009 Alaluusua has been conducting research at the UAL around the topic of "Sketchbooks – a Qualitative Analysis of the Creative Strategies Used in Sketchbooks by Novice and Expert Artists". She has exhibited internationally since early 1990s. The most recent works include 24h Drawing III, Cafe Gallery, London (Apr13); 24h Drawing II, Pullens Yard, London (Dec12); 24h Drawing I, Westminster School, London (Sept12); Sketchbooks of Michael Sandle –video, Royal Academy of Arts, London (Nov11-Feb12).

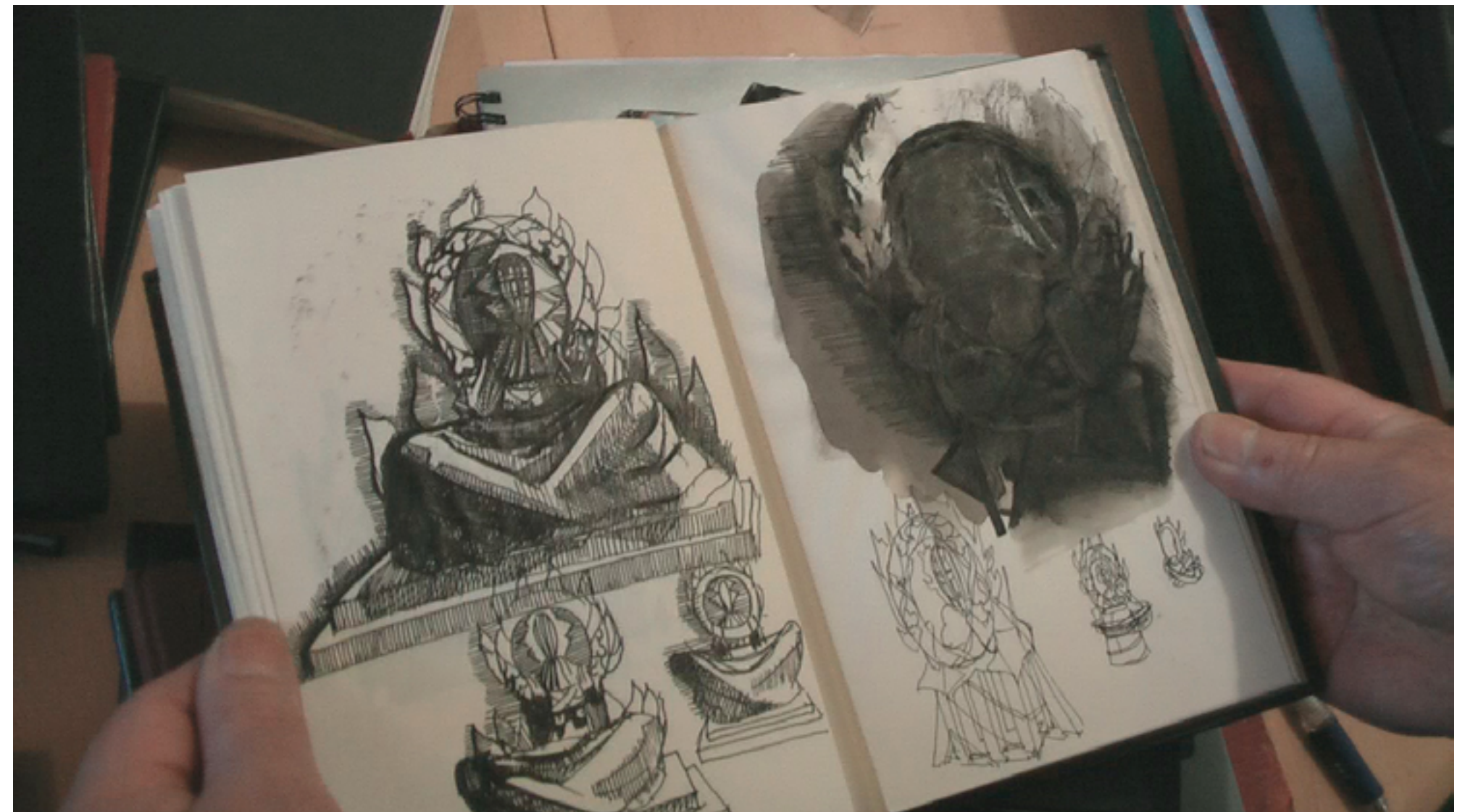
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## Sketchbooks and their private and public dimensions

In my practice-based Ph.D research I am exploring the role of the sketchbook as part of creative strategies used by artists and designers. Drawing is used as a method of investigation in the process of analysing the material from contemporary artists' interviews. My practice combines drawing with videowork and the role of practice is seen as an integral part of the investigation in this research. The mode of exploration has consisted of parallel activities of drawing, reading, writing, interviewing, studying sketchbooks, and working with video. This research is centred on the contemporary and historical use of sketchbooks as creative tools and draws much of its material from artist interviews. Thoughts by Carolyn Ellis and Arthur P. Bochner

about autoethnography have defined the research process together with Laurel Richardson's about writing as a method of inquiry. In this practice-based research sketchbooks are situated in the field of public knowledge and private experience. The original inspiration behind the research comes from my practical experience of sketchbooks in the school context.

Traditionally sketchbooks are seen as private spaces where artists and designers can record their ideas and work through problems; they are seen to 'reveal' the thinking of the artist making a visual record of it. This notion of sketchbooks' capacity to reveal the inner vision (Marks 1972: 2) or offer an insight into the mind of the artist (Kemp 2008: v) is repeated throughout the literature and research conducted about sketchbooks. According to Kirwin (1990: 155; my italics) sketchbooks



“afford an intimate view of an artist’s visual thinking and reveal a private world and creative process”. Turner’s “sketches reveal the artist as himself [...] and show his ideas as they were conceived and not as they were modified, frozen, dressed up and presented (still outrageous enough) to the public” (Wilkinson 1972: 14; my italics). This idea of sketchbooks’ power to ‘reveal’ something is closely linked to the notion of them being private and not meant to be shared with the public. According to Wilkinson “Turner had no intention at all to exhibit his sketches” (Wilkinson 1974: 8) in his sketchbooks “we see the artist working only for himself” (Wilkinson 1972: 12). Vincent van Gogh’s sketchbooks “were intended for his eyes only” (Van der Wolk 1987: 7) and Cézanne’s “private cahiers [...] preserved and protected his

inward life” (Gowing 1988: 11). By examining these objects we enter the private world of the artist (Kirwin 1990: 155). Johannes van der Wolk describes this as looking over Vincent van Gogh’s shoulder as we try to ‘catch’ him at work in his sketchbooks (Van der Wolk 1987: 7). Theodore Reff describes Cézanne’s sketchbooks as “the most private means of expression”; they “bring us close to Cézanne’s process” and in them “we can follow the evolution of a single idea, the pose of a single bather, through six or eight variations [...]; or observe the transformation, stroke by stroke” (Reff p. 8; in Reff & Shoemaker 1989).

During the research process I have conducted over twenty interviews. The interviewees represent different disciplines including painting, sculpture, architecture and lens-based media. A number of Royal Academicians were included and also a small number of students were interviewed at the end of their GCSE and A-level Art courses. In the

presentation I will explore one of the key issues that has emerged from this interview material. That is the public dimension of sketchbooks. I will focus on a small number of interviews analysing the sketchbooks recorded in them and also the artists’ talk about sketchbooks. Parts of the presentation will be in the video format.

## 24h Drawings

‘24h Drawings’ is an on-going series of durational drawing pieces created over 24-hours where I engage in a drawing activity on paper stretched on the walls and floor of a gallery space. This is a series of site-specific drawings where the paper wraps around the architectural details of the place. Each drawing is completed over one continuous 24-hour drawing session where mental and physical boundaries are pushed to the point of exhaustion. These site-specific drawings are both a process and a product with challenging dimensions exploring the physicality of mark making. The mental processes are reflected on series of written observations recorded in a log during the drawing marathon. The continuity of line and movement meet in repetitive motion during the act of drawing opening up an internal dialogue where experiences over time, past and present, blend to one another bringing up haptic memories. The experience of drawing thousands of circles for the earlier 24h Drawings started making sense through thinking about seasonal changes lived through in Lapland, in my native Finland, and particularly when comparing the physical act of drawing to kinetic memories of carrying logs, firewood, to keep the childhood home warm through the bitterly cold winter months. When the body starts to ache in the early morning hours and the thinking blurs, a flood of memories push through questioning the priorities and choices one makes in life.

See overleaf. Alaluusua-figure3 – Elisa Alaluusua 24h Drawing I – 9th to 10th Sept 2012, London.

[Alaluusua-figure2 – Sketchbook by photographer Elina Brotherus.]

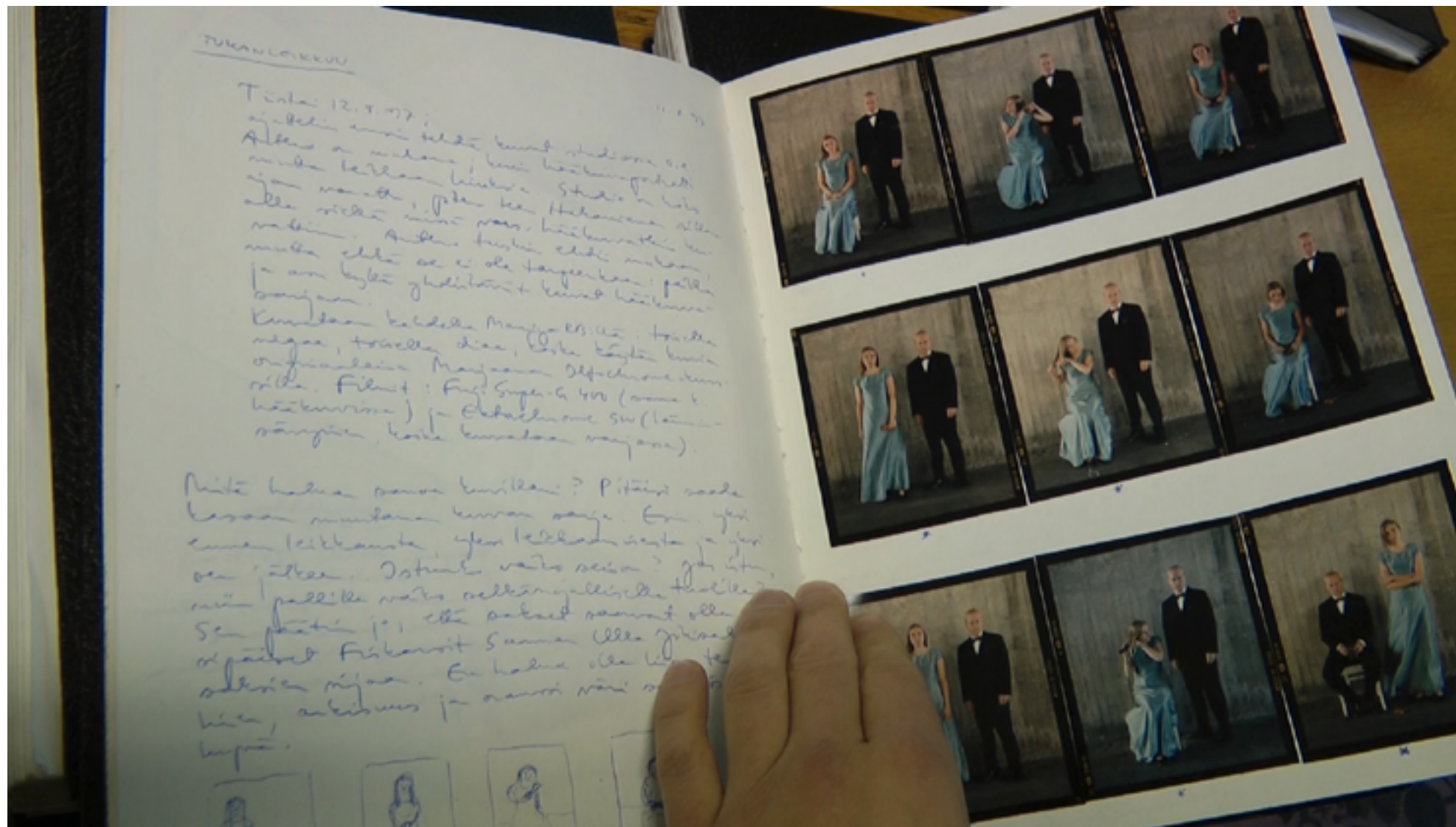




Fig. 3 – Elisa Alaluusua 24h Drawing I – 9th to 10th Sept 2012, London.]

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# Anderson | Isomorphology: Drawing Research and Methodology

## Biography

Gemma Anderson is a London and Cornwall-based artist, PhD researcher and university lecturer whose practice is at the interface of art and science (artistic research in a scientific context). After studying Fine Art Printmaking at the Royal College of Art and the Falmouth University and working on different collaborative projects with mathematicians and natural scientists, she is now completing a practice based PhD studentship. Amongst her recent projects are 'Portraits: Patients and Psychiatrists' and the 'Jerwood Foundation Visual Artist in Residence' programme in London. She received several prizes and grants such as the Leverhulme Artist in Residence Award, the Wellcome Trust Arts Award, the Thomas Dammann Memorial Trust Award and the Arts Council Purchase Award. Her work has been exhibited internationally, as for example at the Freud Museum London and the Wellcome Collection, London and in her recent solo exhibition 'Isomorphology' in London and Berlin. She is Associate Lecturer of Drawing and Fine Art at Falmouth University, Cornwall and has been a keynote speaker at the International Thinking Through Drawing Symposium, London, 2012. Recent publications include 'Portraits: Patients and Psychiatrists' Wellcome Trust, London, 'Endangered: A study of the Declining Practice of Morphological Drawing in Zoological Taxonomy' and 'On Drawing and Mathematics: From Inverse Vision to the Liberation of Form' Leonardo Journal, MIT Press alongside a limited edition Artist's Book 'Isomorphology: An Introduction' with Super-Collider, London. Gemma Anderson, Artist and PhD Researcher, Falmouth University/University of the Arts London  
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As an artist, I am interested in how and what we can know about the morphology of animal, vegetable and mineral species through drawing. Gradually, I have built up a practice based upon observational drawing and collaboration, working with scientists and mathematicians at the Natural History Museum, Kew Gardens and University College London.

Because my interest spans zoological, mineralogical and botanical collections I spend a lot of time drawing specimens and observing form – which has led to an awareness of the resemblances between species of separate kingdoms. As I worked, I became aware that there was no specific documentation of cross-kingdom resemblances between the animal, the vegetable and the mineral. With further thought, I have realized that behind these resemblances are various forms and symmetries. These form the basis of 'Isomorphology' – a new term which I have coined. It is derived from 'Isomorphism'; a mathematical and biological concept.

*"Isomorphology"* Etymology, from Greek: *"Isos"* | 'Same/Equal' *"Morphe"* | 'Form' *"Logos"* | 'Study'

### What is Isomorphology?

Isomorphology is a comparative, drawing based method of enquiry into the shared forms of animal, mineral and vegetable morphologies. As a holistic and visual approach to classification, Isomorphology runs parallel to scientific practice while belonging to the domain of artistic creation. Methods shared with science include observation, collecting, experimentation and drawing although the selection criteria and motivations for study differ. It is complementary to science: addressing relationships that are left out of the scientific classification of animal, vegetable and mineral morphologies.

Drawing is a method, which can reveal and communicate the shared forms of conventionally unrelated species by drawing them together. The tacit practice of drawing is intrinsic to the epistemological value of Isomorphology.

### Is Isomorphology Scientific?

Isomorphology is an artistic practice that is both a critique of scientific order and complementary to the scientific way of knowing,

Isomorphology offers an alternative and visual approach to classification and acts as a reminder that there are many possible ways to find

order in the world. Isomorphology is not a science, a theory or a belief system, it is a creative study. As such, it has epistemological value as a holistic study of morphology and formative processes.

While connected to and derived from the observable, Isomorphology is a symbolic system and mode of abstraction. It can be understood as a visual language, which is coextensive with other modes of classification.

## The Drawing Process

### 1 Observation

Permission to draw and handle each specimen enables close observation, revealing unexpected comparisons of form. Observational drawing involves hand-eye coordination, analysis, delineation, abstraction, improvisation, collage and deep concentration. Perception of the object is a process of transition from experience to judgment, insight to application.

### 2 Trained Judgment

Concentrated observation within the act of drawing creates new perceptual/tacit knowledge. The morphology is observed in detail – activating the process of comparison. Each form observed joins a bank of knowledge in the observer's mind and each new drawing experience triggers a different formal memory stored in this bank. Each drawing adds value to each drawing previously made, and vice versa.

### 3 Abstraction

A necessary process of abstraction occurs during the observational drawing process. All knowledge of the object and its conventional context and name are forgotten; what is left is an involvement in the form of the specimen. The concentration shifts from drawing the whole to drawing a series of parts. This process, which concentrates on form, trains the artist to abstract: to draw and to play with the form, eventually without observing the object and thus entering a new realm of understanding.

### Isomorphology as an approach to classification

The model of Isomorphology I am proposing shares with the scientific model an important emphasis on morphology and observation. But Isomorphology playfully opens up and explores the space surrounding scientific taxonomy and asks different questions about the relationships between species. It relies on the discovery of shared forms in nature and on the invention of a practice to classify them.

Operating to liberate form from the confines of traditional scientific understanding, Isomorphology abstracts form and relativizes that abstraction. In developing the skill of abstract thinking (through drawing practice) it is possible to unlearn the conventions of classification that are inherited and to observe afresh, to form an individual understanding and to discover relations between objects previously unperceived.

#### ***Reflections on the possibilities of Isomorphology***

The forms of Isomorphology can be realized in everyday observations. In a garden it is possible to observe the forms and symmetries in the plant life – bilateral leaves, branches, bilateral leaves on branches – and to ponder the possible combinations of such forms and symmetries. All of the forms and symmetries of Isomorphology can be found in endless configurations in nature. Experimental Drawing methods can be used to recombine the forms of Isomorphology applying the logic of developmental growth processes- to invent new bodies and landscapes with their own logic, similar to the logic, described by Goethe, of the invented plant:

“It will be possible to go on forever inventing plants and know that their existence is logical; that is to say, if they do not actually exist, they could, for they possess an inner necessity and truth.”

To apply Isomorphology is to play a game of observation; the aim is to derive understanding, from direct experience, which adds to the study. Training the eye to perceive abstractly and the mind to think creatively whilst simultaneously maintaining a strong connection to the individual specimen is a complex practice. I believe this understanding can be shared with others as a playful educational model, which relies on science while at the same time building an altered perspective; liberating form from the confines of scientific convention. Isomorphology encourages both learning (non-linear) and ‘unlearning’ – we are deconstructing inherited taxonomies in order to create new knowledge and new approaches.

#### ***Methodology***

The morphology in Isomorphology comes from Goethe, who has influenced my methodology and practice. I have developed a drawing methodology which naturally leads the drawer from observation to abstraction to deconstruction or ‘atomizing’ and then to creative recombination. The method, which I have practiced with groups of Artists and Scientists at the Natural History Museum (London and Berlin)

includes drawing from memory, intuition and imagination.

# Cabral | Sketching and Slow Travelling

## Abstract

I draw because I love drawing.

I like the simplicity and economy of the tools needed.

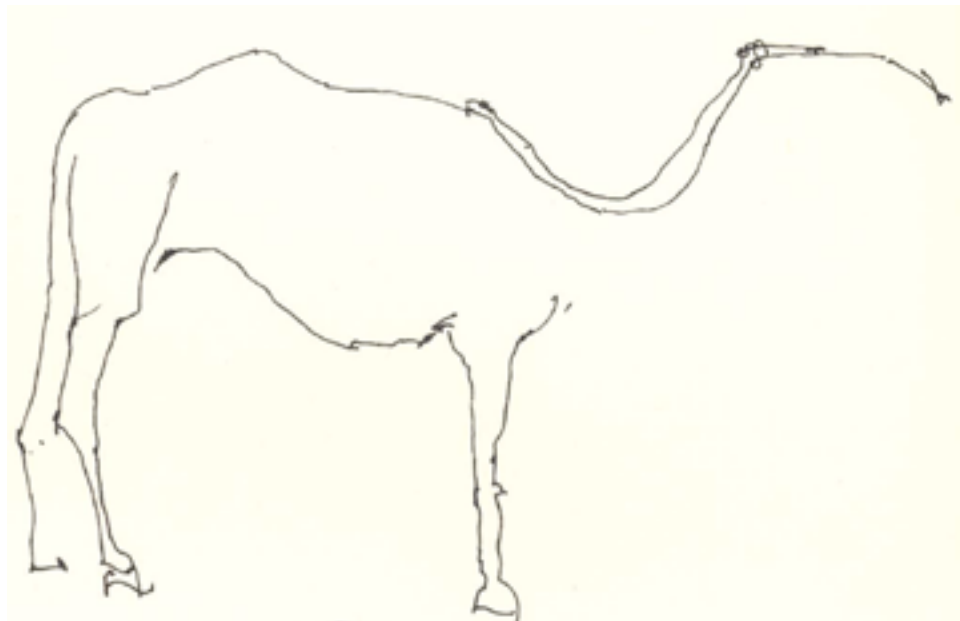
The best of drawing lies with the informality and joy of using sketchbooks, and the best of sketchbooks lies with travel sketchbooks when slow travelling.

As much as I love the act of drawing, I also love having drawn. I love the artifact. Through collecting and revisiting sketchbooks, I am continually reliving my memories.

The more I draw, the more I want to draw; and the more I regret what I have not drawn.

I draw, I sail and I walk my travels.

Email: [pmbcabral@gmail.com](mailto:pmbcabral@gmail.com)



## Biographical Details

I live and work in Lisbon, Portugal, where I was born in 1954. I graduated from *ESBAL* (Lisbon's Fine Arts School) in 1978 with a degree in architecture, and have been a practicing architect ever since. I currently work as an architect for the Portuguese Ministry of Health. In addition, I run the blog *BONECOS DE BOLSO* ([www.bonecosdebolso.blogspot.pt](http://www.bonecosdebolso.blogspot.pt)) and I collaborate with *URBAN SKETCHERS* (<http://www.urbansketchers.org/>) and *URBAN SKETCHERS PORTUGAL* (<http://urbansketchers-portugal.blogspot.pt/>).

I am married with two children, a daughter-in-law and a grandson.

## Sketching and Slow Travelling

When talking about travels, I often hear comments like the following:

“We have been taken care of by an ever present tour-guide who always attended to our every desire.”

“In every town, we visit the same hotel chain. We know what to expect, and everything is planned in detail.”

“We drove north to south, 1.500km in a single weekend.”

“We ‘did’ Côte d’Azur... We ‘did’ Biarritz... We ‘did’ South America...”

I am not interested in these kinds of touristy programs.

I am not interested in long distances.

I am not interested in very detailed schedules.

I am not interested in non-independent travels.

Sometimes the joy of a trip is not its final destination, but the path one takes to get there.

Slow food, slow mail, slow travelling... a homemade stew, a hand written letter, a walking trip.

Slow travelling, lonely slow travelling, frees me from most tight schedules or detailed programs. This kind of travel allows space to satisfy my deepest curiosities, allows for new and unplanned discoveries or even for surprise whenever I get lost and have to find new solutions.

Even when in a group, slow travelling, especially when it is walked or sailed, allows me to enjoy each moment and each place in a holistic way.

Slow travel is without the obstacle of the metallic box of the motorcar, the speed of the motorbike, or the protective shield of the tour guide.

I love being available and present to draw whatever calls my attention, whatever fascinates me.

Learning from experience, I now know that each of my trips is much more successful, more fully enjoyed, and better remembered when it is drawn.

The greatest learning in sketching is the loss of fear. This is the courage to draw “poorly” with no regrets. This is the acceptance of our limits, and the knowledge of our qualities.

I regret every time I did not sketch and, even looking at my not so “successful” sketches, I still only regret the ones I have not drawn.

In the end, I do believe that as much as I love drawing, I love having drawn. In opening old or not-so-old sketchbooks I am transported back to those moments or places. Places that, sometimes, are no more...

## Suggested Readings

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# Dawkins + Pable | Sketching at the Speed of Thought: Weaving Expertise Theory with Drawing Automaticity

## Abstract

Design instructors and students can benefit from viewing and assessing their sketching skill level through the lens of expertise theory. Instructors that possess ‘automatic’-level skills in quick sketching as classified by expertise theorists may be best positioned to assist students in their own sketching success.

Expertise theory identifies five levels of proficiency in tasks. The highest level describes an ‘automatic’ state in which a person successively relies on intuitive understanding rather than calculative rationality (Dreyfus & Dreyfus, 2005, p. 789). In this stage a person can sketch a scene while engaged in another task such as verbal explanation or listening without loss of sketching speed or accuracy. The person is sufficiently fluid in their sketching cognition where there is no longer a need to think about the physical act of sketching, allowing attention to other active tasks such as designing, or directing others through talking.

An instructor’s automatic sketching skill expertise may have benefits for students. For example, instructors can simultaneously demonstrate and explain sketching actions to a student while modeling highly successful actions that can limit the learner’s random trials to the more promising strategies (Dreyfus & Dreyfus, 2005). Importantly, instructors can also fully engage consciously with a student’s situation while simultaneously explaining it in drawn fashion.

## Biography

Jim Dawkins is an assistant professor of Interior Design at The Florida State University where he serves as an instructor in both undergraduate and graduate studios. He is a registered architect in several states, having earned his BA in Design and Master of Architecture degrees from Clemson University prior to practicing for twenty years as an architect, designer and corporate officer with design firms in Atlanta, GA and Vail, CO. Dawkins’ research interest focuses on graphic facilitation, communication, and mediation of ideas through hand-drawing techniques and their realization in hybrid forms of computer aided design.

Jill Pable, FIDEC, ASID is an associate professor of Interior Design at Florida State University and directs the graduate program. She

has B.S. and M.F.A. degrees in Interior Design and a Ph.D. degree in Instructional Technology with specialization in architecture. She served as national president of the Interior Design Educators Council in 2009. She is the author of *Sketching Interiors at the Speed of Thought* and co-author of *Interior Design: Practical Strategies for Teaching and Learning* with Katherine Ankersen. Her research focuses on the design of environments for the underprivileged and she believes that design can make life more interesting, fulfilling and humane.

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## Introduction

Among the many skills that interior designers and architects must possess is the ability to visually communicate ideas effectively. Often this means imparting ideas to others quickly and accurately so that intent is conveyed well. Information can range from an abstract idea of adjacencies of spaces for a designer’s own consumption to an on-the-fly perspective that communicates the look and feel of an unbuilt interior space for a client. Thus, quick graphic sketching is a skill that has utility for designers and consequently, has long been taught in design curricula.

This paper will advocate that design instructors could benefit from thinking about teaching sketching skills through the cognitive framework of expertise theory (Dreyfus & Dreyfus, 2005). Doing so may help them better understand their student’s successes and failures as they practice sketching, and may help them adjust their classroom strategies to better ensure sketching practice success in their students.

Expertise theory took off in the mid to late-1970’s and since that time has been the subject of continual examination by educational psychologists and researchers (Simon & Chase, 1973; de Groot, 1946/1978; Feigenbaum & McCorduck, 1983; Ericsson & Smith, 1991). It has been examined in the context of many different types of tasks including accounting computations, music conducting and piano playing (Bloom, 1986). Dreyfus & Dreyfus developed a framework of expertise theory that identifies five levels of proficiency in tasks (2005: 779-792). The highest level describes an ‘automatic’ state in which a person successively relies on intuitive understanding rather than calculative rationality (Dreyfus & Dreyfus, 2005: 789). In this stage, a person engages with a task while engaged in another task such as verbal explanation or listening without

loss of task speed or accuracy. The person is sufficiently fluid in their cognition where there is no longer a need to think about the physical act of doing the task, allowing attention to other active tasks such as talking or listening. Persons at this level enter a realm where unconscious ‘doing’ supports the freedom of complex thinking, and they can more freely engage in metacognition about their skills to positive effect.

The application of expertise theory to architectural sketching has been only topically explored (Gobert, 1994; Pable, 2000; Chen, 2004). Expertise theory may explain why people who are experts in sketching can do so fluidly and without loss of speed or accuracy while they engage in a second task simultaneously, such as explaining the scene they are drawing to someone else. It may also help explain how experts in sketching engage in this act without actively thinking about it to communicate an idea. These are positive traits in that they seamlessly integrate sketching into their overall design process, enabling a powerful visioning tool to assist and influence design decision-making and communication.

In contrast to expert behaviors, students often struggle to sketch quickly and accurately. The majority of design student’s previous experiences with drawing typically include depictions of still life scenes created in an art class, doodles in school notebooks, and perhaps some cartooning for class projects or notes to friends. These sketch images and objects are constructed independent of formal rules or guidelines – they are drawn as presented to them both physically and in their mind’s eye. While the sketches may represent the student’s ideas, they can often suffer in their success with regard to accuracy, scale, depth, and context. The student lacks the requisite skills to adequately describe his or her own thoughts. As a result, students can develop an anxiety about sketching, or convince themselves they will never learn this skill.

The authors are both experienced instructors that teach architectural sketching and have observed student behaviors that seemingly correspond to the five stages of expertise theory as outlined by Dreyfus & Dreyfus (2005: 779-792). This paper reports on these five expertise stages and links their characteristics to observed student perceptions, actions and skills. The comparison may prompt discussion and potentially help other instructors understand why students sometimes think and struggle the way they do with the complex cognitive task of sketching.

**Stage 1: The Novice**

*Expertise Theory:*

The instruction process begins with the instructor decomposing the task environment into context-free features that the beginner can recognize without the desired skill. The beginner is then given rules for determining actions on the basis of these features, like a computer following a program (Dreyfus & Dreyfus, 2005: 782).

1. *A Stage 1 student's experience of sketching:*

John enrolls in a graphic techniques class at the start of his interior design school education. His goals are to develop quick sketching skills in order to begin visually illustrating, in two and three dimensions, design intents representing his studio projects. He has seen examples of previous classes drawings exhibited in the hallways and on the class's website and has an uneasy feeling, perhaps that borders on outright fear, of the gap between his current drawing knowledge and the quality of the drawings displayed. His first thoughts of "I'll never be able to do that" or "I'm just not that good" fuels his trepidation. He cannot fathom what it will take to grow from his loose doodles to more refined, accurate, and realistic imagery. His perception of the expertise needed to complete these kinds of drawings leads to his inability to relax and stay open-minded.

The instructor begins by describing the various components that make up the frameworks for one and two-point perspectives such as the horizon line, vanishing point(s), a true height component, and scalar elements such as scale figures. John starts drawing in a sequential fashion building up a framework of components leading to a gridded scene – a generic, three-dimensional construct simply containing a floor, two walls, and a ceiling. Within this grid, John is able to recognize the three-dimensional environment and within it begins to explore simple object construction. Seeing the measured path of drawing instruction set by the instructor, John loosens up, puts pen to paper, and calmly moves through the skills exercises.

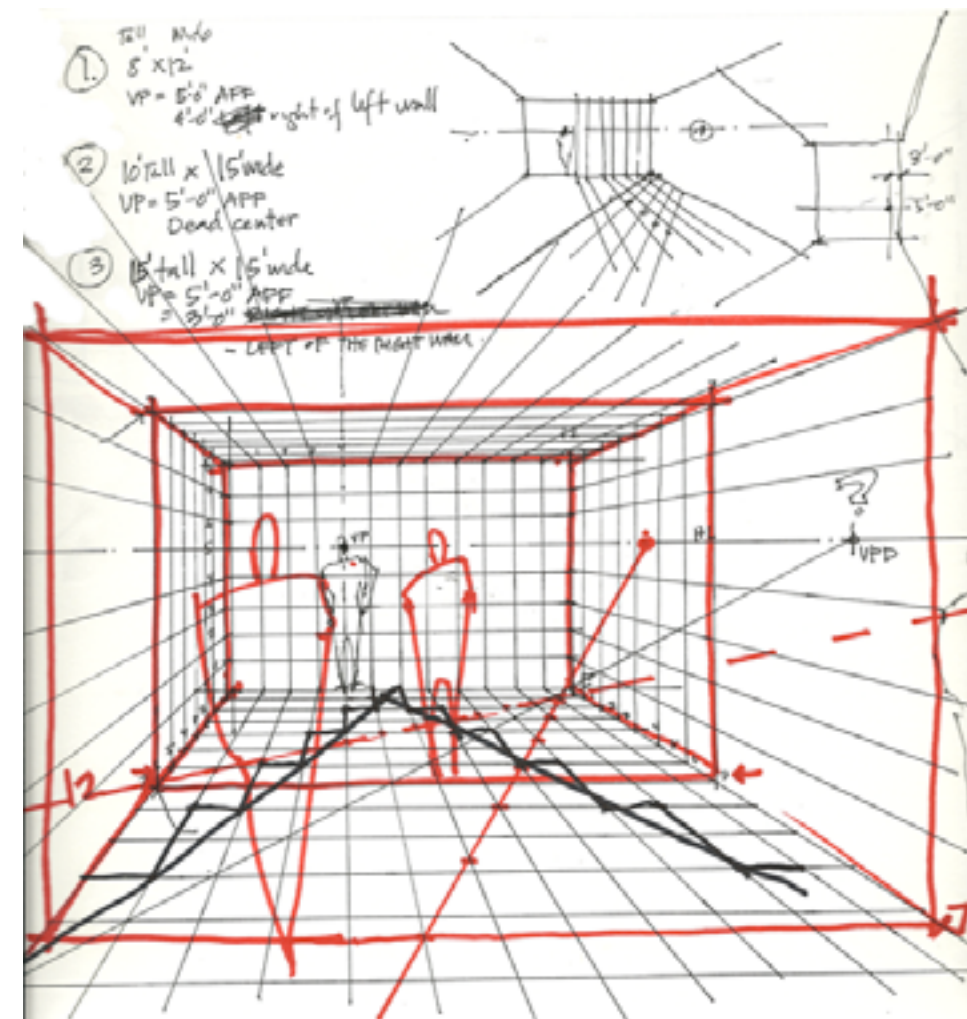
1. *An instructor's potential teaching approach for Stage 1 learners:*

At this point, the instructor is simply introducing and defining the framework elements and rules of perspective drawing. Perspective construction can be taught in a multitude of ways as evidenced by the plethora of perspective instruction books, internet sites, and even mobile device apps. Most likely, the novice student will not be able to see beyond a collection of rules and parts. This is where the instructor

has an opportunity to empathize with his or her class confirming that indeed, perspective construction can be laborious, slow and oftentimes confusing. A few basic instructional methods could include the following:

1. First and foremost, this is a critical time for the instructor to exhibit a healthy degree of excitement, energy, and enthusiasm for sketching. The instructor's confidence in their own expertise as well as their ability to develop those same skills in their students should be clearly expressed.

2. The instructor can present the perspective 'pieces' or components individually, define their usual positions, and instruct the students in their assemblage. This is similar to building a plastic model car where the builder arranges the pieces on a table, organizes them relative to



*Dawkins-figure 1 – Basic perspective components of a perspective (Dawkins, J., 2012a)*

their anticipated positioning, and then pieces the parts – according to series of assembly steps - together to form the car. For quick sketching techniques, those components would include a horizon line, vanishing point(s), true height component, and a scale figure. With sketching, the rules for constructing a perspective are explained and exemplified by the instructor and then practiced by the students using a sequential fashion of applying one element after another until the perspective 'bones' of a scene are in place.

3. The instructor can guide students through analyses of perspective scenes from magazines, books, and the instructor's own collection of perspective sketch drawings, deconstructing each scene into its various components such as the vanishing points and horizon lines along with where and how they are arranged to create the scene. (See overleaf. Fig. 2 Dawkins-figure 2 – Perspective and scene deconstruction (Dawkins, J., 2012b).)

Understanding the rules of sketching is good, but for the interior design student, it only works if the sketching activity has an intended application. Specifically, the interior design student "needs not only the facts but also an understanding of the context in which that information makes sense" (Dreyfus & Dreyfus, 2005: 783). That is, within the student's drawn constructs (their perspective grids), they can begin to see how the parts are organized to create the whole. The rules are tested through exercises aimed at integrating a drawing process into the student's design behavior. The discipline of setting up a sketching framework creates a measure of freedom for the instructor to point out subtle aspects of a student's sketch and then guide them into manipulating the rules in order to customize the scene.

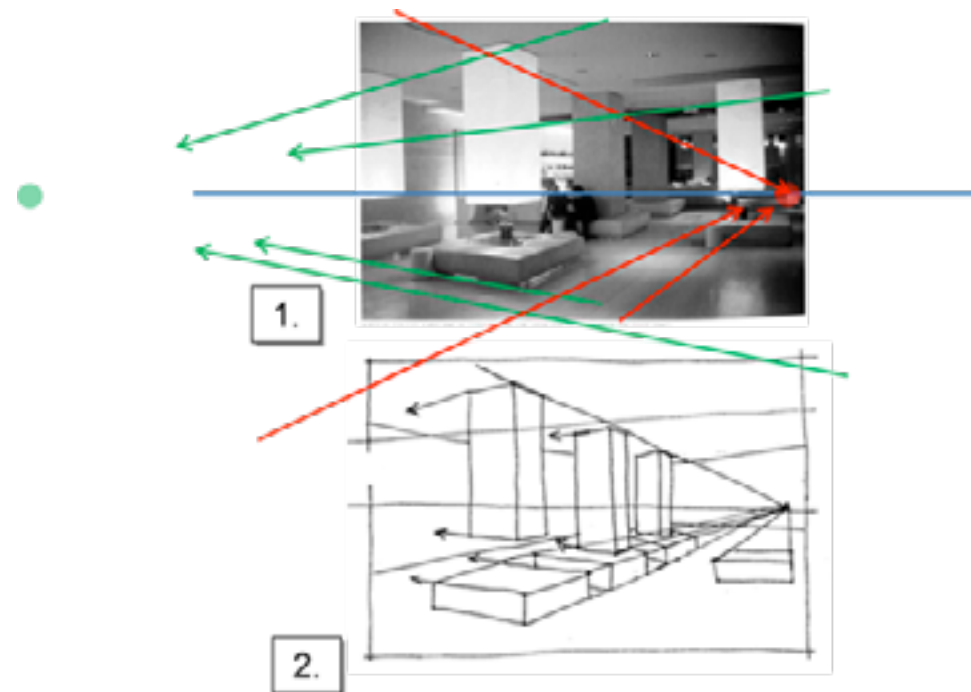
**Stage 2: Advanced Beginner**

*Expertise theory:*

As the novice gains experience actually coping with real situations and begins to develop an understanding of the relevant context, he or she begins to note, or an instructor points out, perspicuous examples of meaningful additional aspects of the situation or domain. After seeing a sufficient number of examples, the student learns to recognize these new aspects. Instructional maxims can then refer to these new situational aspects, recognized on the basis of experience, as well as to the objectively defined non-situational features recognizable by the novice (Dreyfuss & Dreyfus, 2005: 782).

1. *A Stage 2 student's experience of sketching:*

Anne prepares herself to sketch a perspective scene for her interior design project. She recognizes the vanishing point as a necessary tool



Dawkins-figure 2 – Perspective and scene deconstruction (Dawkins, J., 2012b).

in constructing a one-point perspective. However, she is unable to effectively construct a perspective without the grid. With the grid constructed, Anne now has a visual reference whereby she can begin to analyze the various aspects of her intended scene. Class demonstration by the instructor shows her that moving the vanishing point to the left side reveals more of the right wall and vice-versa. Moving the horizon line up or down influences how much or little is seen of the ceiling and floor plane for ‘birds-eye’ and ‘bug’s-eye’ views respectively. Anne’s replication of the demonstrations shows that these point and horizon line manipulations work for her as well. However, she does not yet intuitively know that combining these two manipulations lends further good options for views.

**An instructor’s potential teaching approach for Stage 2 learners:**

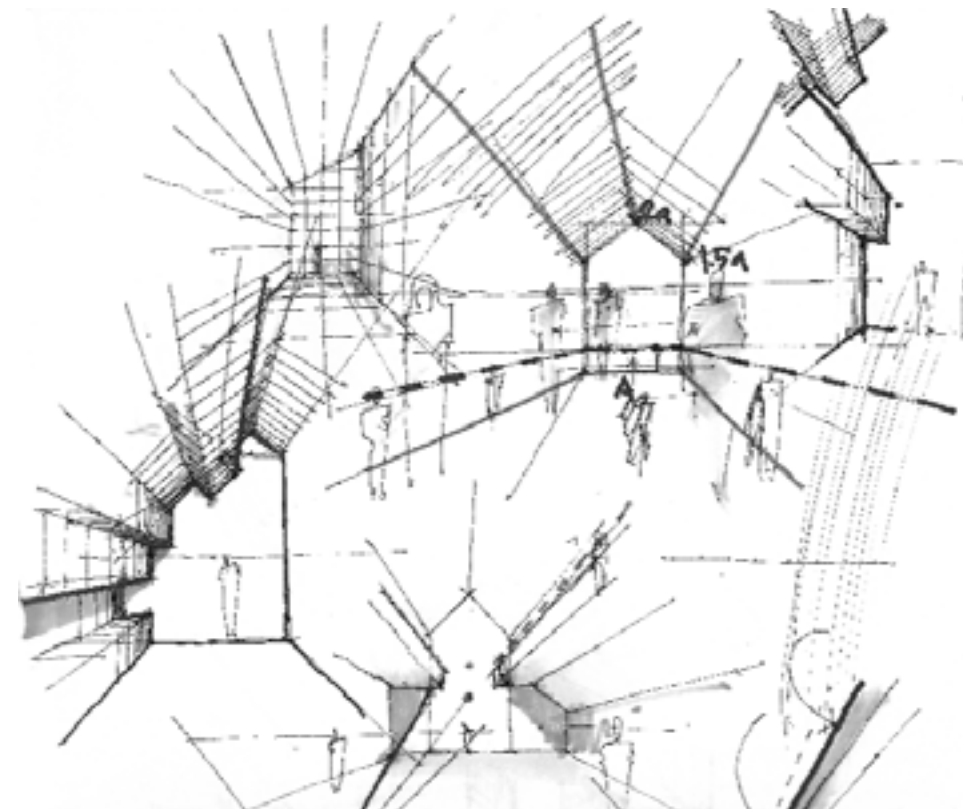
Expertise theory suggests that the instructor should assume the role of coach at this stage to assist the student in pinpointing and recognizing relevant aspects such as vanishing points and horizon lines. Four tenets become important in Stage 2.

1. Class discussion should now organize and allow learners to simply ‘get their arms around’ the material. The emphasis at this point is for students to use the maxims that have been given to them (Dreyfus & Dreyfus, 2005: 783) while the instructor simultaneously points out

certain aspects that are important or can be manipulated. Therefore, letting students experience first-hand the movement of vanishing points is key—not just observing the instructor doing this by him/herself.

2. Learning at this stage is necessarily detached and undertaken by the student in an analytic sort of way (Dreyfus & Dreyfus, 2005: 783). This is requisite at this stage because, in these authors’ opinion, the learner is not sufficiently fluid with the cognitive load of the task that they can become more personally involved. This detachment makes a measure of repetition of elements such as scale figures, horizon line, vanishing point(s) a logical classroom inclusion for the instructor. This drill-style approach at this stage – constantly doing it again - can help reinforce fundamental skills, strengthening the learner’s ability to make certain choices without thinking about them. As the learner progresses, the instructor can start to compound rules in an additive fashion, for example coupling a known element (such as manipulating the vanishing point left and right) with raising or lowering the horizon line.

Dawkins-figure 3 – Sketch perspective “do it again” drill and practice (Dawkins, J., 2012c).



3. The instructor can suggest that the student utilize tracing paper overlays when creating their gridded scenes, physically sifting through ideas that worked and trashing sketches that didn’t. They do it again – over and over – all the while seeing which horizon line, set of vanishing points, scene viewpoint, or series of scalar elements work together to represent the student’s desired sense of what it is they are trying to communicate. The student is able to define which features, aspects and processes over which they can exert control.

4. The notion of quick sketching relative to design process efficiency becomes important. In this stage, emphasis on speed can begin to enter the classroom conversation, coupled with the ‘do it again’ drill and practice approach.

5. The objective and analytic stance in this stage can also be applied to perspective scene composition – so that the learner can couple choices of view and the tools that create them with quality compositions (as long as the criteria for ‘quality’ is defined for them).

Overleaf: Dawkins-figure 4 – Analyzing the composition of a scene (Dawkins, J., 2012d).

**Stage 3: Competence**

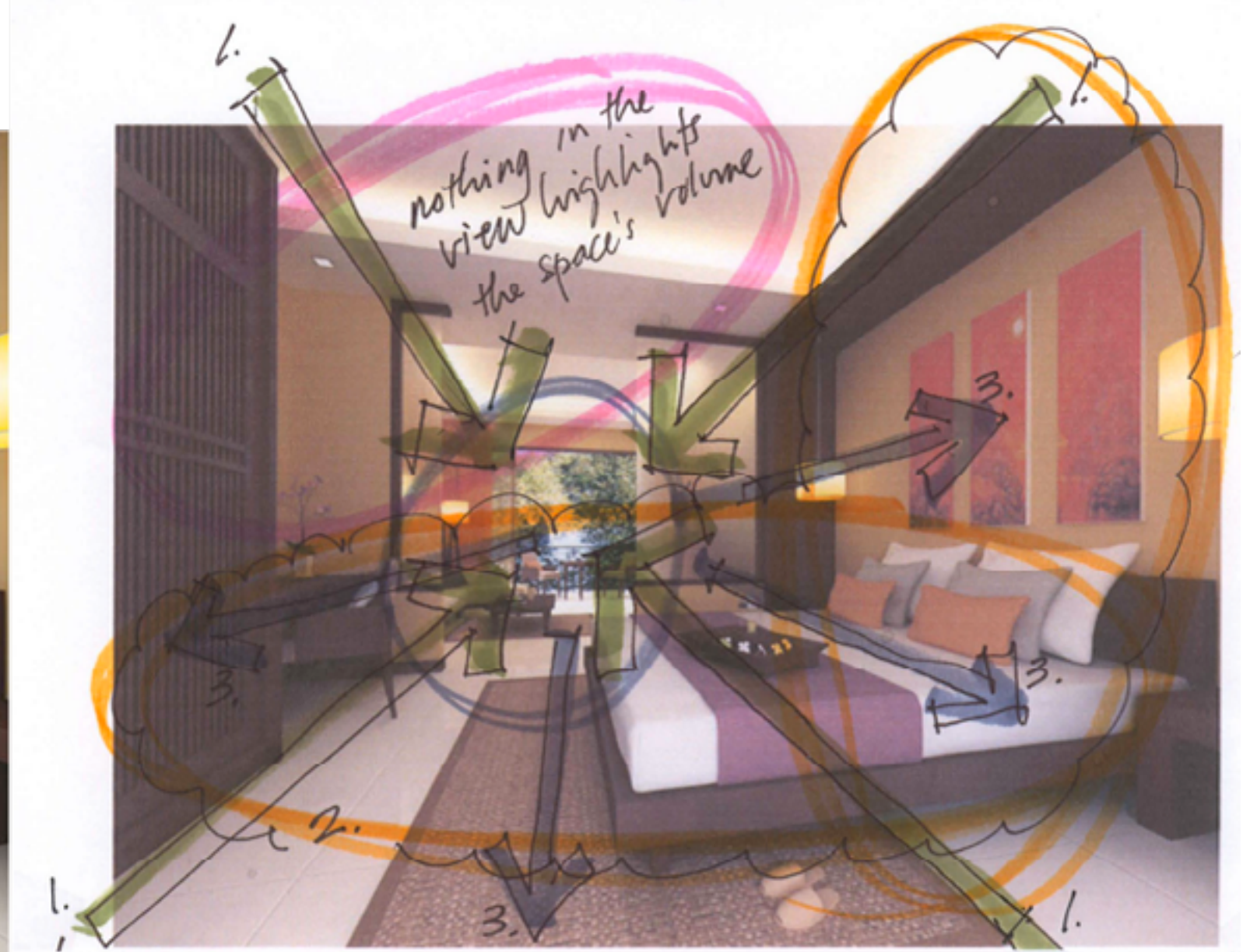
**Expertise theory:**

With more experience, the number of potentially relevant elements and procedures that the learner is able to recognize and follow becomes overwhelming. At this point, since a sense of what is important in any particular situation is missing, performance becomes nerve-racking and exhausting, and the student might well wonder how anybody ever masters the skill.

To cope with this overload and to achieve competence, people learn, through instruction or experience, to devise a plan, or choose a perspective, that then determines which elements of the situation or domain must be treated as important and which ones can be ignored (Dreyfus & Dreyfus, 2005: 783).

**A Stage 3 student’s experience of sketching:**

Eager to put his ideas on paper, Mark decides to pull up from his floor plan diagramming and start constructing the four sketches required of his class v project that illustrate the form and shape of his space. He is excited yet anxious to start ‘seeing’ his ideas come to life. His design involves an oblong lobby space with rows of columns, a two-story central atrium, and a monumental stair connecting the first, second, and third



*Dawkins-figure 4 – Analyzing the composition of a scene (Dawkins, J., 2012d).*

floors. Mark immediately constructs a two-point generic grid within which he wants to sketch the lobby. His grid turns out a bit flat and fails to convey the length of his lobby. He starts another grid that addresses the lobby length but doesn't adequately describe the rhythm of columns defining the central space leading to the stair and atrium.

An hour later, he creates a third grid constructed in one-point fashion that manages to illustrate the columns within the longitudinal direction of the lobby, but cuts off the atrium view. Mark scrambles to lower

the horizon line in the grid to capture the atrium's volume but has lost valuable time in his schedule. And it still doesn't look quite as he had imagined! Moreover, he has yet to address any of the other sketches he has to produce. So many rules, all those component variables.... the anticipated joy in applying his design ideas is stymied by the anxiety of potentially getting it wrong while burning through his available time. Frustrated with the time loss and failure to establish a framework within which to sketch, Mark abandons the sketches and returns to his floor plan.

As the assigned scenes (or design scenarios) grow in quantity and complexity requiring the use of multiple rules and features in a variety of

ways, the sketcher becomes overwhelmed. Overload occurs. Additionally, the speed at which they are expected to make appropriate decisions with accurate applications can make the process intimidating. Rules are missed, features left out, aspects of the sketch unrecognized or unheeded. Frustration sets in. The student's desire to get better and faster is beyond their ability to recognize the context and then apply the appropriate variable components. A much needed measure of control over the process becomes evident.

This third stage of competence in sketching can be long drawn out process, and hence the extended length of the ensuing discussion here. The

design student's sketching growth typically moves through the rules and guidelines of the novice and advanced beginner stages with rapid progress. Over time, the repetitive nature of skills building exercises performed in a methodical sequence of procedures can build a foundation for both speed and accuracy in sketching. However, when, where, and how to use these basic skills takes time, and plenty of it, months, perhaps even years. As such, both student and instructor should anticipate an extended period of both instruction and practice in this stage.

**An instructor's potential teaching approach for Stage 3 learners:**

The student is responsible for illustrating their design thinking – drawing those conceptual ‘things’ that they can only see in their mind's eye. Yet, in their Stage 3 thinking, there is no reference point, no fully-baked components – just a feeling of what it should look like, of what they sense the space wants to be. Here the student should be encouraged to take a chance – “just draw it and see what it looks like” – and run with their choice and work the sketch to a point that it can be evaluated relative to the student's intent. However, as Dreyfus & Dreyfus (2005: 784) point out, “since at this stage, the result depends on the learner's choice of perspective, the learner feels responsible for his or her choice. Often, the choice leads to confusion and failure. But sometimes things work out well, and the competent student then experiences a kind of elation unknown to the beginner.”

Bits and pieces of their sketches seem to capture a quality the student can only sense and feel. A well-drawn component confirms a good idea and generates further design thinking and consideration. Other aspects of the scene or object become apparent that may be subject to other drawing rules. A poorly used feature or rule fails to illustrate an aspect of the drawing accurately causing the student distress. Again, they search for a way to sketch at a pace that can keep time with their thought processes. The number of variables that can affect a sketch's outcome – choice of horizon line height, location of the station point, distance between vanishing points, size of scalar elements – challenge the student's skill to document them effectively and efficiently. Eager to quickly move ahead, the student looks for control over a seemingly limitless set of possibilities. Reckless speed can kill, but it can also induce a measure of exhilaration when controlled.

Stage 3 can be frustrating for students. In part, this is because reverting to sketching within a time-consuming constructed and static grid that demands adherence to rules fails to produce a sense of place or space or the essence of an object at the speed the students mind is racing. “It

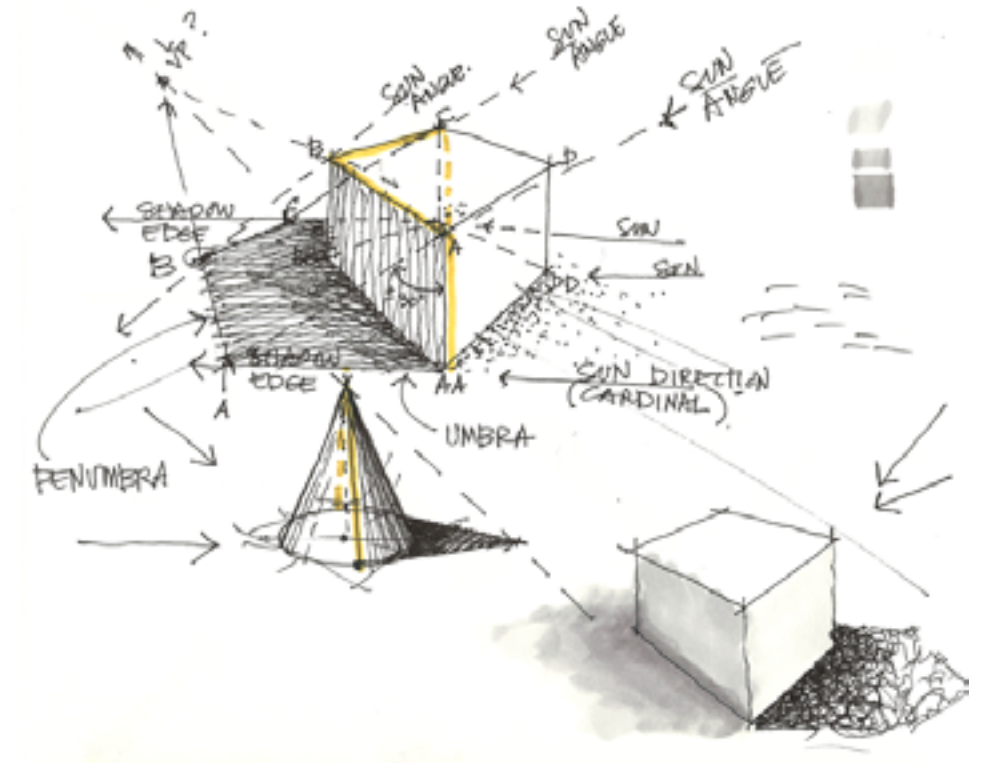
looks like a chair but not my chair.” Additionally, if design thinking has to wait on drawing construction, then the student is in jeopardy of losing that “loving feeling”; the idea of what that chair needs to be that is at the forefront of their mind starts to fade. To ensure capturing the emotive quality of their design idea requires sketching at the speed of their own thought processes. They have to add and take away rules and features quickly in order to account for all the aspects unique to what it is they are designing and drawing. They need to be driving by looking at where they are going, not where they have been.

For the student, the chair needs to look and feel like the chair they have in mind – the scale and proportion they can sense will be appropriate to a person sitting in it and the space in which it occupies. Only then can the student accept success. Conversely, in a scenario devoid of feeling such as drawing within the digital construct of a computer, the computer is successful when it accurately interprets and displays points and lines based on the user's data input. The computer and its software do not care if the student is right or wrong in their drawing, only that it has followed the rules and produced a representation of an object, space or place. It does not care if it looks bad or doesn't ‘feel right’. The computer is not aware that the chair seat looks too hard, that the back is too low, or that the legs are too fat or thin. It was successful in that it created something by following the rules. In this way, computer perspective construction may, in the opinion of these authors, be a different thought process for students than perspective construction on paper. While this topic is not addressed here, it is worthy of further consideration with regard to expertise theory.

In Stage 3 a student's drawing process needs direct supervision and mentoring. They will benefit from a verbal guide – the instructor – as well as a set of graphic guides – drawing frameworks – in order to make good decisions in quick order so they can maintain their design momentum. Reflecting on the plastic car model illustrated earlier, while the instructions initially appear to be clear in their description of how to build the car for a little boy, it may take his dad interpreting the entire assembly by bringing his own model-making skills to the fore before the boy can complete the car. The dad can instruct his son in how to arrange the parts on the worktable in anticipation of assembly sequencing, which hobby knife, piece of sandpaper, and type of glue to use for varying assemblies, and where two items can be assembled alongside each other thereby reducing the time required to complete the steps. The sketching instructor can perform in the same manner as the dad.

**Several teaching strategies may assist Stage 3 learners:**

1. The instructor can direct the student to devise a set of predetermined quick responses to anticipated drawing situations, using a playbook approach based on past drawing experiences that identifies successful approaches to solving problems. By having multiple preset



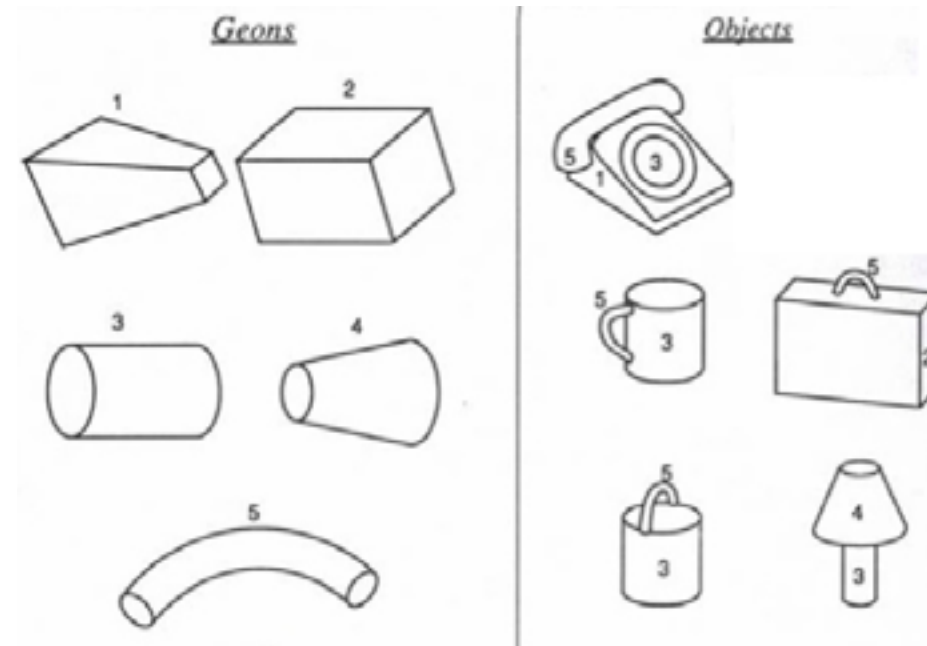
*Dawkins-figure 5 – Predetermined responses to the construction, shading, and shadowing of a cube (Dawkins, J., 2012e).*

solutions (such as a series of previously constructed perspective grids with a variety horizon lines, vanishing point spacing, scale allusions) the student can address scene selections quickly and with more confidence.

2. The instructor should introduce theoretical aspects of drawing cognition that can assist students in building their own notions of sketching processes. Biederman (1987: 116) suggests, the process of sketch development might be organized around the parts of the item being pictured, referencing the notion of “object recognition”. That is, a sketch may start with the student constructing the components that make up the item and then assembling them accordingly. This could be a piece of furniture, a room or space made up of various “geometri-

cal ions or geons”, a set of “primitive elements ....a modest number of simple geometric components—generally convex and volumetric—such as cylinders, blocks, wedges, and cones” that, combined in numerous configurations, produce the image (Biederman, 1987:115).

*Dawkins-figure 6 – Geons and objects – components of object recognition (Geons and objects, 2012).*

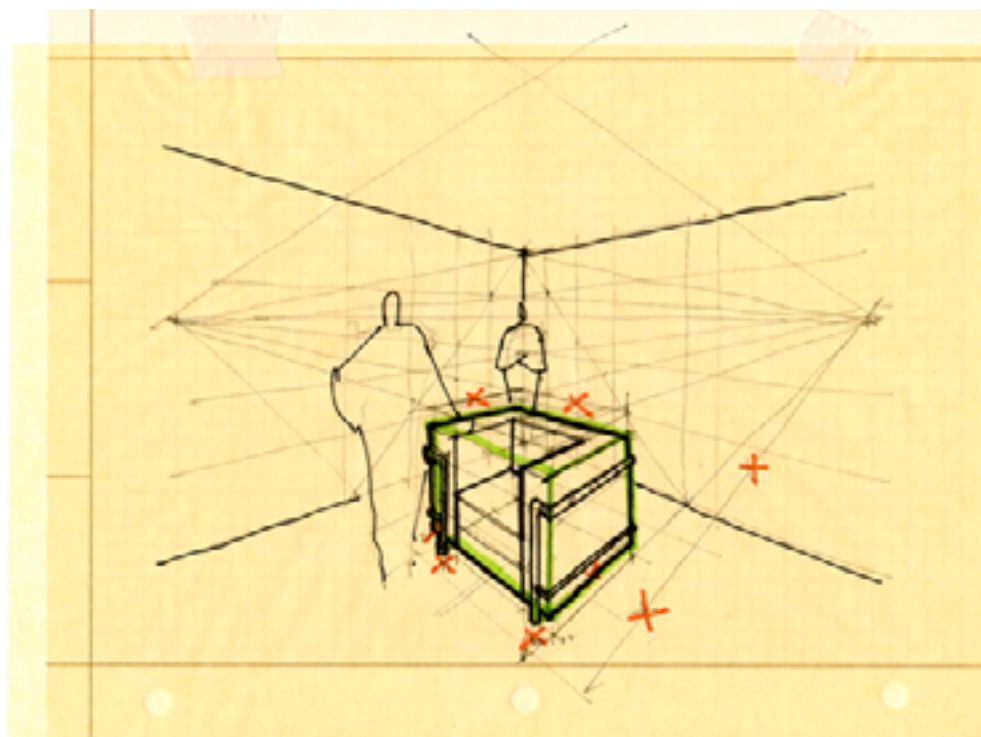
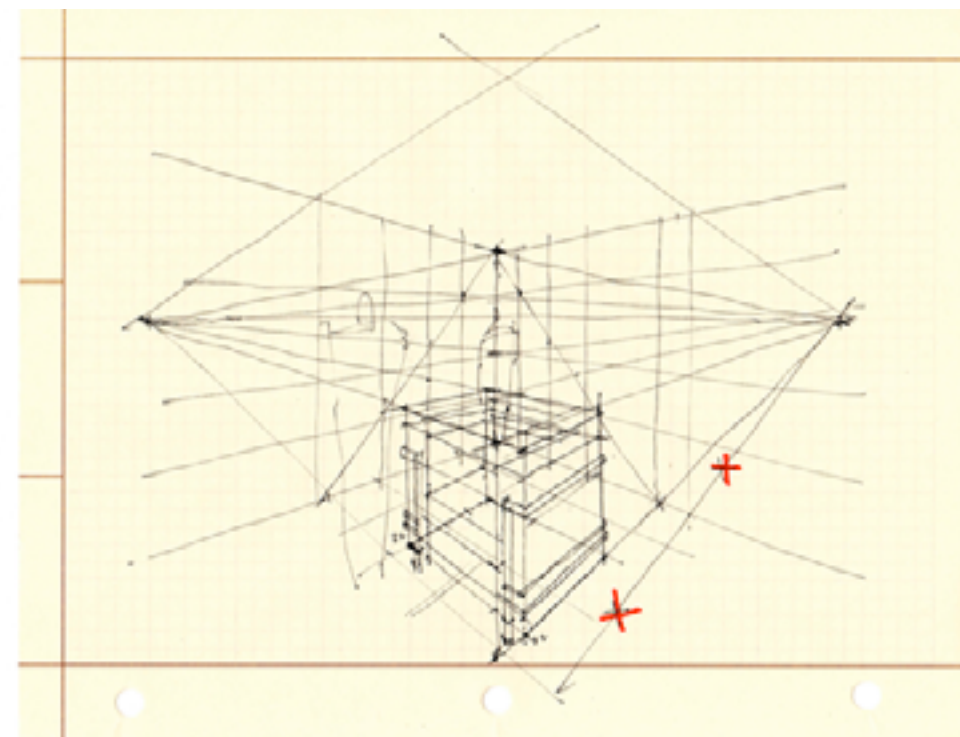


3. It may be that the instructor advocates that a piece of furniture or millwork always starts with a perspective cube or box that the student ‘carves’ into (reductive rather than additive). Spaces with large desks, counters, or specialty walls may start as a two-point perspective with an offset true height line to one side or the other. A corridor or hallway, a hall of columns, or a bilaterally symmetric furnished room might demand a lower horizon line but with a dead-center vanishing point. Whatever the case, the student develops a plan to address the situation and moves forward with it.

*See below: Dawkins-figure 7 – Progressing through a sketch by ‘carving’ into an object (a cube) (Dawkins, J., 2012f).*

4. It is a good idea to keep the students ‘juices’ flowing by urging them to draw no matter what the student thinks of their work. The instructor can encourage the student to accept the chance that their sketch may not work out and just dive in and draw. Failure to express one’s mental picture of a design can often lead to a degree of frustration. Rather than retard the speed and immediacy (and perhaps joy) of design thinking, drawing by rule and feature could take a back seat while searching for the means to illustrate their ideas, the need to communicate the fit and feel of an object or space or place. Students can get

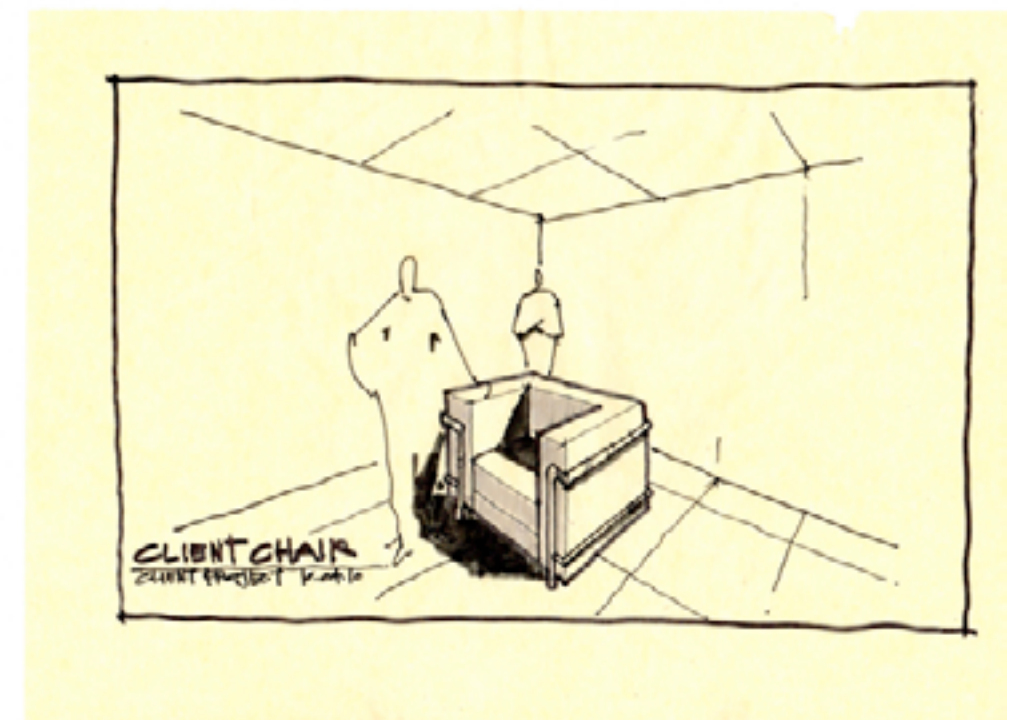
*Dawkins-figure 7 – Progressing through a sketch by ‘carving’ into an object (a cube) (Dawkins, J., 2012f).*



the idea down on paper and then start shaping it with the appropriate tools. Dreyfus & Dreyfus (2005: 785) observe that “failure to take risks leads to rigidity rather than the flexibility we associate with expertise.”

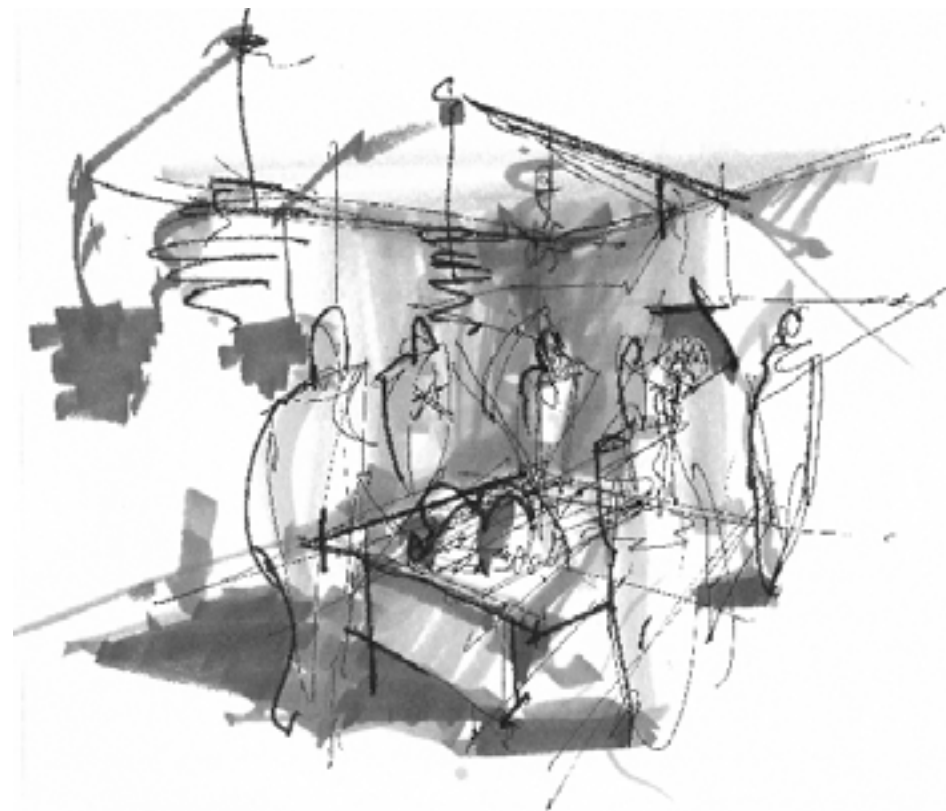
5. The instructor should realize that “as the competent student becomes more and more emotionally involved in the task, it becomes increasingly difficult to draw back and adopt the detached maximum-following stance of the advanced beginner” (Dreyfus & Dreyfus, 2005: 785). Reverting to drawing within a perspective grid utilizing a pen, triangle, and hard-lined components with very specific rules results in scenes bound by the grid’s construction. As long as the student draws within that gridded box and refuses to take risks by creatively interpreting the features of that grid and the rules that created it, he/she will have a more difficult time succeeding in communicating design ideas unique to their own personal thoughts and feelings. Dreyfus & Dreyfus’ (2005: 785) research cautions that “in general, if one seeks to follow general rules one will not get beyond competence.”

6. Imploring the student to continue drawing should be a basic tenet of the instructor’s teaching behavior. It is necessary to understand that the physical act of drawing – of putting pen or pencil to paper by hand – cannot be passed over by either the student or instructor. The loss of an idea due to a rigid observance of rules and steps can be devastating to a design student. In an article describing the link



between handwriting and the brain, author Gwendolyn Bounds (2010) cites a 2008 study in the *Journal of Cognitive Neuroscience* wherein character recognition was tested. Researchers observed that adults in the study who wrote by hand exhibited “stronger and longer-lasting recognition of the characters’ proper orientation, suggesting that the specific movements memorized when learning how to write aided the visual identification of graphic shapes (Bounds, 2010). Following this line of thinking, if the sketcher can plow ahead with the sketch, it may be that the practiced skills of perspective construction will eventually inform a more accurate graphic representation of their idea.

7. Instructors can reinforce the notion of quick sketching as part of a process and not a rendering or final product. They are the means to an end, not the deliverable (although they can be loosely used in that manner if circumstances such as quick instructor design critiques, intermediate and informal design presentations and regular reviews of design progress are needed). As such, the student should be encouraged to keep it simple, picking and choosing relevant features and aspects specific to the context of a contemplated scene or view. The goal is to quickly illustrate an idea (or multiple variations of an idea) so that it (they) can be evaluated relative to its design potential, not evaluated as a sketch in and of itself.



In the studio, the instructor is able to guide the student to successful decision making by highlighting those choices made by the student that resulted in effective and efficient graphic communication as well as those that were not as successful. The instructor pushes the student to take chances with the rules, with line weights, scene composition, vanishing point widths, etc., suggesting all the time that practice will inevitably lead to faster and easier sketching techniques. This is a critical point in the learning process – here the instructor’s own passion for drawing along with the mental and emotional energy they exhibit, can have a profound influence on the student’s own excitement about drawing. The instructor needs to encourage, inspire, and drive the student. An instructor’s constructive criticism can lead the student to positive and expanded skills growth. This is the point where the student can “own it” and decide to make their work very personal, and willing to go through the ups and downs, successes and failures, of quick sketching as they seek to graphically communicate design ideas. It is here, “only at the level of competence is there an emotional investment in the choice of action” (Dreyfus & Dreyfus, 2005: 786). Chances are that if a student gets involved and takes measured risks with their sketching – takes ownership of and becomes accountable for their idea communication – they will be more inclined to ‘do it again’ until they get it right.

Dreyfus & Dreyfus (2005: 786) state that “the point, however, is not to analyze one’s mistakes and insights, but just to let them sink in.” Students should feel okay to be disappointed when a sketch misses the mark, but they need to respond with an ‘oh well, live and learn, do it again,’ or “that was great – but what made this one work that didn’t work for the other sketch(es)?” The student needs to get a ‘feel’ for what went right and what went wrong and why and constantly build on these conclusions, expanding the aspects of a sketch relative to the subtleties of the context it is in. The student can begin developing “adaptive control” over their drawing behavior, recognizing which actions can possibly influence desired outcomes based on the student’s proficiency, but that still need a level of control to be considered adapted (Cleeremans, 2006: 413). Similar to driving a car in rush hour traffic, with repeated use a driver can learn to adapt their driving to the traffic flow, moderate speed effectively, prepare for upcoming lane changes, and anticipate other driver’s.

Dawkins-figure 8 – A simple sketch capturing the conceptual essence of a scene (Dawkins, J., 2012g).

Developing competency in drawing, specifically quick sketch graphics, requires the student to move beyond rules obedience and onto a level of intuitive action. What is in the back of one’s mind (all those rules, features, aspects, etc.) subtly moves to the front of the mind in support of a sense of what the student is drawing (Barry, 2013). Much like the developing mountain biker, the techniques of balance, pedaling, and handlebar grip residing in the back of the mind come to the fore in order to support the biker’s trek over rough outcroppings, through narrow passages, and down single-track paths. It is in developing a sketching intuition through a rigorous process of skills building, situational understanding, and emotional involvement that a student’s sense of what to sketch and how to sketch it will lead them to quickly communicate design ideas at a proficient level.

#### Stage 4: Proficiency

##### Expertise Theory:

Only if the detached, information-consuming stance of the novice, [and the] advanced beginner...is replaced by involvement, is the student set for further advancement. Then, the resulting positive and negative emotional experiences will strengthen successful responses and inhibit unsuccessful ones, and the performer’s theory of the skill, as represented by rules and principles, will gradually be replaced by situational discriminations, accompanied by associated responses (Dreyfus & Dreyfus, 2005: 786).

##### A Stage 4 student’s experience of sketching:

Mary is assigned the quick sketching duties for a team project brainstorming session with her fellow students. She is chosen because she is methodical in her sketch process and has developed enough skill through practice, analysis, and more practice to draw with speed. Initially, Mary interprets the ideas clearly and concisely. Her skills are on par with the pace of conversation. She senses that her sketching and the group’s thinking are not distinctly separated. However, as the group’s brainstorming intensifies and the ideas flow faster and more freely, Mary finds herself trailing their thoughts (as well as her own) with her sketches. The group’s design thinking is outpacing her ability to capture the essence of the discussion, the subtleties of the variations expressed, and the fit and feel her sketches need to represent. Time is lost changing gears from one sketch to another and then another. She knows what she wants to draw, senses what it should look and feel like, but her sketching ultimately falls back on competencies based in a world of rules and guidelines. While Mary records the majority of the session effectively, it falls short of completely capturing the moment.

The expert grasps the bigger picture rather than having to move through all the steps to get there. However, for the proficient sketcher, the ability to react automatically with an appropriate response still needs development. Although the proficient sketcher must still decide what to do, they rely on their competencies to generate and develop sketches rather than falling back on the rules level of the novice and advanced beginner. At this point, the proficient sketcher cannot waste time by engaging in an analysis of their actions; rather they must proceed with a positively reinforced ‘gut’ feeling that leads to immediate decision making and pen to paper movement. The proficient sketcher must hit the ground running, replacing “reasoned responses” with “intuitive reactions” (Dreyfus & Dreyfus, 2005: 786).

One cannot divorce the physical act of sketching from the more conceptual notion of ‘feeling’ one’s way through a sketch. The physical contact of pen or pencil to the drawing surface and the sensation of touch, elicits numerous responses in the brain. In an article exploring the benefits of handwriting, Julie Deardorff (2013) cites research indicating that “handwriting increases brain activity” and “hones fine motor skills.... Handwriting aides memory. Handwriting proficiency inspires confidence.” In Deardorff’s article occupational therapist Katya Feder, an adjunct professor at the University of Ottawa School of Rehabilitation, explains that good handwriting “integrates motor pathways into the brain. When it becomes automatic or learned, there’s almost a groove in the pathways” (Feder as cited by Deardorff, 2013).

Proficiency also allows the student to engage in a sort of pleasure principle for sketching. By discerning which applied skills lead to pleasing results and which ones end up as painful mistakes, students begin to develop a feel for their sketching. Additionally, as noted earlier, the physical act of good handwriting (or sketching in the context of the topic at hand here) can elicit feelings of pleasure. Writer Lynda Barry, in a radio interview discussing drawing and writing (Barry, 2012), pursued the notion of writing and pleasure in her writing workshops. She commented that “one of the reasons why this [writing] is so pleasurable, it’s not just because the experience of writing and remembering is pleasurable, that’s true. But it carries out into the world. When you’re finished doing it, the world looks more alive.” For the proficient hand sketcher, the same holds true. Good sketching – perspective accuracy, line weight variations, shading, shadowing, context representation – done quickly, can produce good feelings. Drawings look ‘more alive’, have character, and are able to express the sketcher’s impressions of a conceptual idea or real scene. Physically manipulating the drawing

instruments and media helps connect both types of ‘feelings’ – the physical and emotional.

*An instructor’s potential teaching approach for Stage 4 learners:*

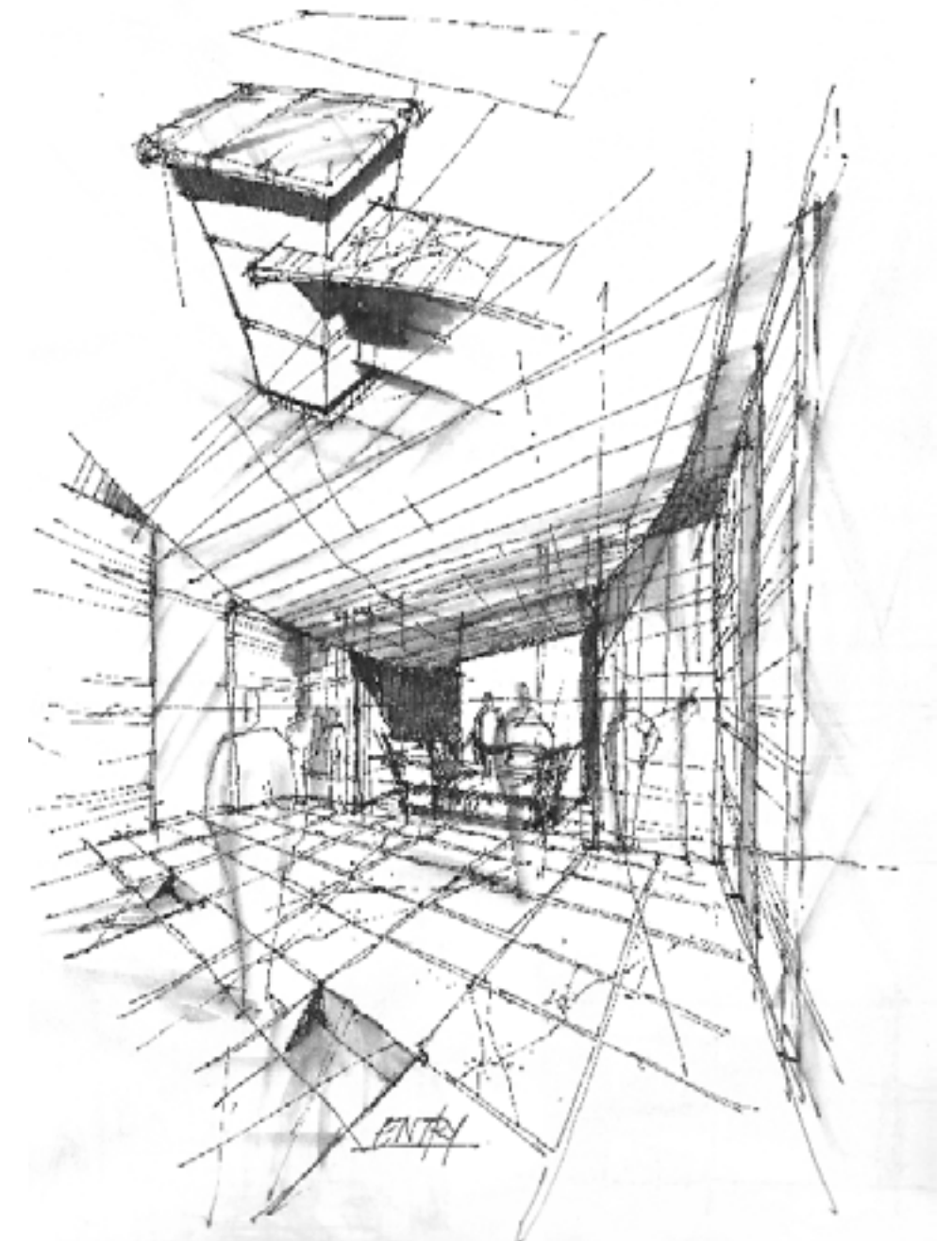
With quick sketching, the ensuing positive reinforcements of quick, fluent sketching coupled with the negative perception and effects of a slower, rules-based adherence to drawing exactitude prompt the student to develop a trained proficiency that becomes an innate part of their drawing behavior. Successful sketches feel good when the essence of their shape and form is communicated effectively. In addition, since good sketching can be a pleasurable experience, there is a better chance that students will seek to repeat that behavior. The instructor can nurture this growth in a number of ways.

1. The instructor can regularly affirm and reaffirm the student’s successful sketching expeditions.
2. Engaging in one-on-one sketching with the student, the instructor can move back and forth with drawing responsibilities in repetitive drills that involve speed, urging the student to intuitively react to a sketch’s progression rather than looking for and relying on the reasons that support its development. Additionally, the instructor should express their own pleasure in working through the sketching process, reveling in the creative energy that an expert experiences and exhibits when actions are lock-step with thoughts.
3. Due to their significant sketching experience, the instructor has the opportunity to evaluate the student’s trials and errors from a perspective. That is, the instructor’s experience over years of sketching development enables him/her to analyze a student’s physical movements – pen/pencil grips, movements of the fingers, hand, and arm, placement and movement of the paper – as well as ‘sense’ the mental and emotional intricacies of the student’s thinking while they are drawing. The instructor has a feel for the student’s proficiencies and is able to more quickly advise and illustrate for the student more efficient and economical sketching actions.
4. An instructor can make sure the student is involved with their drawing and that they are ‘in the moment’, concentrated fully on expressing their ideas clearly and completely. To this end, the instructor needs to ensure that the classroom or studio is maintained in a manner where the student can reduce negative distractions (such as the need to multi-task with social media) and deal with positive distractions (such as the instructor talking about the student’s ideas, other students

expressing their opinions, etc.).

5. Providing rewards when successful risk taking is achieved can help motivate students. Similar to gaming systems where completion of one level of activity moves the player on to further levels of more complex and challenging (and usually more fun) tasks, the student can move to

Dawkins-figure 9– A more demanding sketch typical of the proficient sketcher, (Dawkins, J., 2012h).





more demanding sketch problems where the reward level increases as the student takes more risks with speed, accuracy, and technique.

As a proficient sketcher, the student moves into a behavior of ‘doing’ rather than ‘thinking’. Dreyfus & Dreyfus (2005: 786) observe that “action becomes easier and less stressful as the learner simply sees what needs to be done rather than using a calculative procedure to select one of several possible alternatives.” An overwhelming need to graphically express (emotionally) one’s ideas, to visually articulate a feeling, takes the place of trying to describe it verbally. Here, design concepts for a student’s project can only be conveyed by drawing them out. As elusive as a concept can be to define, it eventually has to have its meaning revealed and interpreted. Thoughts are fleeting, and one needs to seize them immediately in order not to lose the feeling they embody – the emotional significance of an idea’s essence. The proficient sketcher “sees the question that needs to be answered but has to figure out what the answer is” (Dreyfus & Dreyfus, 2005: 786).

#### **Stage 5: Expertise**

##### *Expertise theory:*

The expert not only sees what needs to be achieved; thanks to a vast repertoire of situational discriminations, he or she also sees immediately how to achieve the goal. The ability to make more subtle and refined discriminations is what distinguishes the expert from the proficient performer (Dreyfus & Dreyfus, 2005: 786).

##### *A Stage 5 student’s experience of sketching:*

The design development stage of Sam’s new class project begins with an assignment requiring him to create several quick sketches to convince his client (a second student in this role playing exercise) that his design concept can be realized in the building’s interior architecture, furnishings, and finishes. Sam prepares a number of quick sketches to be used in discussions with his client. As the meeting progresses, Sam finds himself drawing within and on top of his original drawings as he and the client trade comments about the design. The sketching moves at a rapid pace with lines, shapes, and forms responding immediately to verbal suggestions and directions. In Sam’s mind, he cannot distinguish his thinking and talking from his sketching – they are one in the same. The solutions are immediately clear, and his uninhibited intuitions are free to guide his decision-making.

##### *An instructor’s potential teaching approach at Stage 5:*

At this stage, the instructor focuses on directing the student to fine tune specific drawing behaviors.

1. Instruction is ‘real-time’ – as the student sketches a line or roughs out a composition, the instructor quickly points out nuances of the sketch or the student’s technique that the student may not be considering. The instructor engages in drawing with the student. At this point, it is easier for the instructor to teach by drawing rather than speaking – the action of drawing the instructions is faster than verbally giving directions. A successful instructional moment has two minds working as one with the student channelling the instructor’s expertise into their own sketching actions without the need for physically duplicating efforts. The student learns to sense the instructor’s next move or comment. The two together draw as one – the student driving and the instructor giving directions while traveling at a high rate of speed.

2. Instruction takes place with the direct transfer of expertise – telling (verbally) and showing (graphically) the student those techniques and decisions that will more often than not lead to success or failure. Rather than having to actually experience all the scenarios and drawing situations the instructor has been through, the student can listen and apply what is being taught immediately. There is no wasted time in going through those experiences at that moment, as the student just applies the information and moves on. The expert instructor is not an expert at teaching the rules but rather the expert in how to use them.

3. The instructor can moderate metacognitive discussions about the automaticity of drawing. He or she also has automatic responses to intuitive reactions. The expert has trained for it. They have done it a thousand times. They have done it right and wrong a thousand times. Per Dreyfus & Dreyfus (2005: 788), “no amount of rules and facts can capture the knowledge an expert has when he or she has stored experience of the actual outcomes of tens of thousands of situations.” They know what works and what doesn’t in any given situation. They have a good feel for sketching. There is an emotional attachment to and recollection of successful quick sketching. The expert “does not calculate, or solve problems, or even think. He or she just does what normally works and, of course, it normally works” (Dreyfus & Dreyfus, 2005: 788).

#### **Conclusion**

As noted earlier, effective graphic communication through quick sketching requires one to be “in the moment” – similar to a jazz or

blues musician’s adlibs based on a feeling or “vibe” they are getting from the music being played and how the various parts of the band start merging into one whole. Adaptation and improvisation characterize the response. For the sketching design student, on-the-fly decision making is achieved through an unconscious trust in the discipline of drawing learned at the novice and advanced beginner stages. Action takes place within milliseconds of thinking. For the expert, thinking and acting are literally happening at the same time.

Similar to a multilingual expert such as a translator speaking in several languages with numerous persons all at the same time, the expert sketcher speaks fluently in ‘drawing’ – there is no mental translation required to concurrently think about how to draw and the act of drawing itself. For the expert, “what must be done, simply is done” (Dreyfus & Dreyfus, 2005: 788). Sketching at the speed of thought, one can ill afford to slow down and think about what one is doing. Expertise for the design student is in seeing (by sketching) the problem’s solution(s) and not in the rules by which it will be solved. Trust and confidence in one’s risk taking is rewarded with speed and accuracy. Sketching is no longer a calculated gamble, but a guaranteed winning bet.

It is clear that to instruct others in the act of sketching is to wrestle with complex cognitive stages of understanding, action, and ultimately the ability to take effective action without thinking. It may be helpful to consider the stages of expertise to help answer the questions of why students think the way they do, make mistakes they are prone to make, and encounter the mental roadblocks that populate the journey toward sketching proficiency. Similarly, taking instruction action that is mindful of the stages of expertise may be supportive of meeting students where they are, and best assisting them to the next stage of their understanding.

**Images ( A sample of DRN Subsection title)**

- Dawkins, J. 2012a. *Untitled*. [sketch] (Author's own collection).
- Dawkins, J. 2012b. *Untitled*. [sketch] (Author's own collection).
- Dawkins, J. 2012c. *Untitled*. [sketch] (Author's own collection).
- Dawkins, J. 2012d. *Untitled*. [sketch] (Author's own collection).
- Dawkins, J. 2012e. *Untitled*. [sketch] (Author's own collection).
- Dawkins, J. 2012f. *Untitled*. [sketch] (Author's own collection).
- Dawkins, J. 2012g. *Untitled*. [sketch] (Author's own collection).
- Dawkins, J. 2012h. *Untitled*. [sketch] (Author's own collection).

[*Geons and objects*] 2010 [image online] Available at: < <http://www.blog.theteamw.com/wp-content/uploads/legacy/2010/12/geons.jpg>> [Accessed 27 August 2012].

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# Dawson | Drawing with Holoshop

## Abstract

Drawing as a proposition, has long been established as the prime conduit for channeling thought into visual form. Fundamental to the quality of drawing is the interaction between the support and the medium, such as the resistance between the texture of surface and a brush, pencil or crayon. This paper examines the experimental research potential of drawing in three dimensional software environments through haptic interfaces where the relationship of medium and support are experienced in dynamic ways.

The authors are the inventors and developers of Holoshop 3D drawing software, which is used in conjunction with a haptic interface. Holoshop software makes it possible to draw marks in three dimensions within a virtual space while experiencing forced-feedback. Holoshop software enables the artist to feel varying qualities of viscosity and resistance as they move the stylus though 3D space. This haptic feedback occurs in real-time to the artist's hand as force, friction and damping functions. Holoshop software further develops drawing research, as it enables the possibility of exporting drawings from the 3D CG environment as holograms, 3D prints and animations.

## Biography

A/Prof Paula Dawson is an artist who for the past three decades has primarily created holographic works. Currently she is a lecturer in painting and drawing at the College of Fine Arts, University of New South Wales, Sydney and Chief Investigator of the Holoshop research project. A/Prof Masa Takatsuka is the Director of ViSLAB (Visualization and High-Performance Computing Lab) at the School of Information Technologies, the University of Sydney. His primary research interests are Data Visualization, 3D Computer Graphics and Human-Computer Interaction. Dr John Stavrakakis is a postdoctoral researcher at ViSLAB and has been working in the area of 3D Computer Graphics for a number of years.

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## History objectives and proposals by the *Holoshop* group

The impetus for creating a new way to draw virtually in three dimensions came about from Dawson's different observations of 3D production in programming and haptic devices. Dawson had been using wireframe and open models to make scenes for digital holograms. commercially available 3D computer graphic packages, particularly Maya. Dawson found that these software products, while efficient for making solid three-dimensional objects, lacked certain flexibility in the process and tools which would enable the easy construction of open three-dimensional forms. Dawson hypothesized that the amount of information necessary to create a three dimensional object in space using a hologram was far less than with other stereoscopic or other means of representing space due to the high spatial fidelity of the holographic image. Therefore it was desirable to make scenes, which were made from just small parts of lines rather than complete and solid subjects. Dawson believed this would also lend a more animated quality comparable to her earlier work Luminous Presence. In this research project it was found that the less solid the subject appeared in the hologram the more present the subject seemed. This led Dawson to surmise that if subjects could be made from very small amounts of lines, they may in fact seem to be present to beholders.

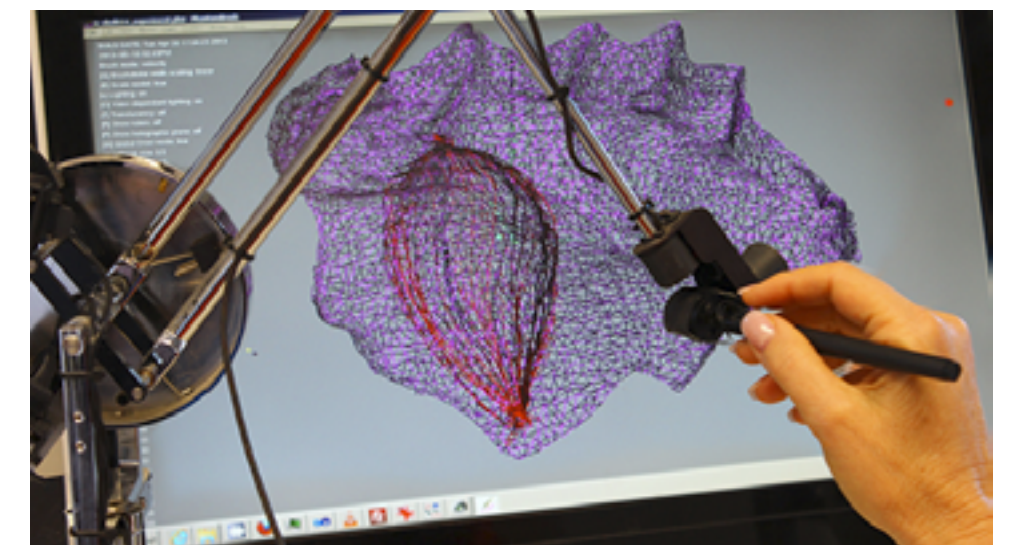
The idea for using the Phantom with a hologram was first developed at Massachusetts Institute of Technology, by Dr Wendy Plesniak, a former PhD student and member of the Spatial Imaging Group, Media Lab, MIT. Plesniak later went on to develop further more complex interactive haptic hologram systems (Plesniak, Pappu, Benton, 2001). Dawson had the opportunity to experience Plesniak's experiment while a scholar in residence and PhD student at the Media Lab MIT. Plesniak's experiment entailed a small stylus version of the Phantom through which the user could feel and manipulate a wireframe holographic image calculated in real time on holographic television (HoloTV). The hologram could be felt with the haptic pen and the user could push on the image of the cylinder, which was made as a wireframe. Similar to a lathe, the user could push in parts of the shape and actually sculpt a hologram image with rotation symmetry in real time. After using this haptic/ visual interface of hologram and haptic pen Dawson wondered if it would be possible, instead of using the Phantom in its usual configuration of feeling existing computer graphic data, to instead generate computer graphic data. In conversations Takatsuka, Head of the Scientific Visualization lab at the University of Sydney, it seemed possible and this modality of drawing underpins all the versions of the research project.

A number of applications to major government Australian Research Council (ARC) research funding ensued. Dawson made the first project application for funding in 2006, as sole Chief Investigator of Modeling Light: The Experimental Enhancement of Surface Character In Synthetic Holograms Using Haptic Means of Preproduction. Even this early version of the project referenced the drawing styles of Michelangelo because Dawson felt that certain techniques of Michelangelo and his deep feeling for three-dimensional space would somehow provide a key to a method of drawing in three-dimensional space that could be applied for holographic imagery.

This first application was unsuccessful and so a second application with more investigators was proposed in 2007. In 2007 a new application called, Modelling Light: The Enhancement Of Surface Quality In Computer Graphic Holograms, with a similar idea of using the Phantom as a haptic interface to draw in three dimensions was proposed with investigators A/Prof Paula Dawson, A/Prof Masa Takatsuka for software development and Dr John Gage, the art historian for analysis of Michelangelo's drawing. This project application was also unsuccessful. However in that year a University of New South Wales major equipment grant enabled the acquisition a major research tool, the Phantom Premium 1.5.

Premium 1.5, which is a haptic hardware device, that comes without software and has extreme accuracy in representing and calculating movements in three-dimensional space. As the project application to the ARC was ranked highly but did not receive funding, the University

*Fig. 1 - Drawing on a mesh template in Holoshop with the Phantom Haptic interface*



of New South Wales provided a small amount of seed funding which was used to employ IT student Shea Goyette to write software to enable drawing with the Phantom. This early version of the software was called Phantombrush.

In 2008, another version of the project was submitted for funding to the Australian Research Council, this time also with A/Prof Dawson, A/Prof Takatsuka and DrGage. In this version we emphasized the importance of Michelangelo to the study as a kind of a model of how the drawing may be able to take place. The 2008 application was entitled, Modeling Light: Michelangelo's Techniques Applied Through A Touch Sensitive Tool To Create 3D Content For Holograms. This application was also unsuccessful and it was criticized by the assessors for bringing together two completely unrelated areas of study. However the rationale of the study had been to reverse engineer Michelangelo's techniques

and to use the holographic drawing tool to unpack Michelangelo's techniques and bring them to light.

Dawson envisaged this tool differing greatly from existing computer graphic tools, which lacked the potential for easily generating an expressive and inflected range of marks. It would instead enable the fine art method of building an image whereby every part of an image is formed independent of a global order. Painting and drawings are built up part by part - there is no global light or point light which illuminates the subjects of the scene, a common feature of computer graphic environments. In these environments subjects are constructed in computer graphic environments are from solids or primitives which are brought

*Below. Fig. 2 VIDEO- First impressions of using Holoshop - David Eastwood Associate Head of Painting, The College of Fine Arts, UNSW and a Sydney based artist*



into a space, deformed or extruded or carved and then a texture map is added to the surface. After the shape of the subject is made, the light is positioned, and then when the image is rendered out, all of these interrelated elements of shapes, surface textures and lights of the whole environment that has been built are involved. This is impractical for an application of real time holograms because the amount of time that it takes to render out the image too long to render in real time. Aside from the practical limitation of the approach, Dawson believes that this method of building in 3D computer graphics from solids actually reveals or reinforces, a particular approach to ideas about the materiality of reality. For example with the computer graphics method mentioned above, subjects seem to be actually "there" and then lights are directed onto them and then we render out from a specific viewpoint. This is almost a classical physics kind of model of reality - things exist and are rendered from a particular point of view. Whereas the processes and thinking behind paintings or drawings, even if of concrete subjects are made in a different way. If it's desirable to imply that there is a light shining on the edge of a cup or lighting the top of a piece of fruit, there is no need to have an actual physical light. The artist will draw the light or the highlight onto the surface just with a dot of paint or chalk at the exact point when it needs to be. This feature of localization of image forming events has great potential for imaginative expression. Further it is well understood in the fine arts that the process of image making itself has a qualitative impact on viewer reception - particularly when this process is in some way revealed.

The unique character of the traditional fine art approach to image building underpins the Dawson's quest to forge a three dimensional drawing tool which makes possible, just as in traditional painting/drawing, to create discrete 3D image elements simply - each one having a position in space, a value and a hue. Such image elements which have a position in space a colour and a value in three-dimensions represent an opportunity to work in a traditional fine art method of image building in a digital computer graphic 3D environment which is in fact more direct and immediate than most 3D image building methods. The other advantages of this process are that the final scene is potentially computationally light, that the mark making can be very sparse and that the image can be understood in 3D without articulating every aspect of the subject.

*Fig. 3 overleaf.*

As Holoshop is primarily a drawing method using line in three dimensions, it's relevant to mention one necessary difference between line in 2D and 3D. Line drawing can in 2D outline a two-dimensional intersection of the perimeter of some kind of object/figure, against a ground. If the line defines, from one specific viewpoint what the outside or exterior perimeter of that particular form will be, once this line drawing is rotated in a three-dimensional space, that perimeter becomes meaningless because it only describes the shape of the object/figure from a very specific viewpoint. In some circumstances this shift in perception between a line as an abstract shape in space transiting to a recognizable form as a scene if shifted in three-dimensional space can be a feature and a

*Fig. 3 VIDEO- Dr Mary Ann Coutts, Head of Drawing at the National Art School and a Sydney based artist testing features of Holoshop*

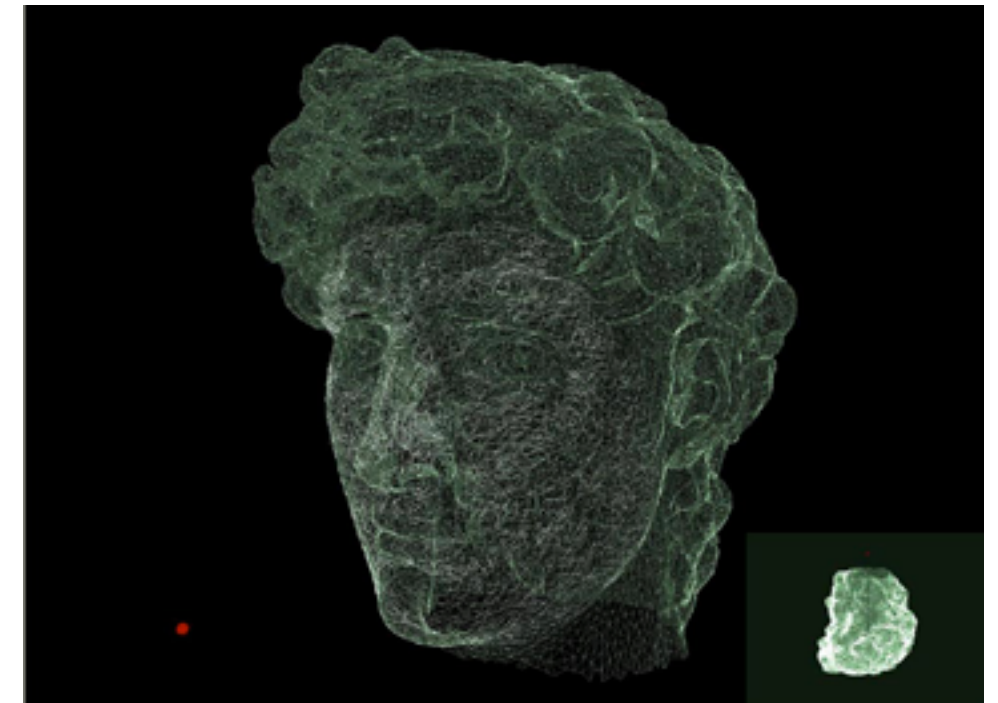


*Top right. Fig. 4 - A 3D template of David's head made from laser scan data by Stanford University's Digital Michelangelo project*

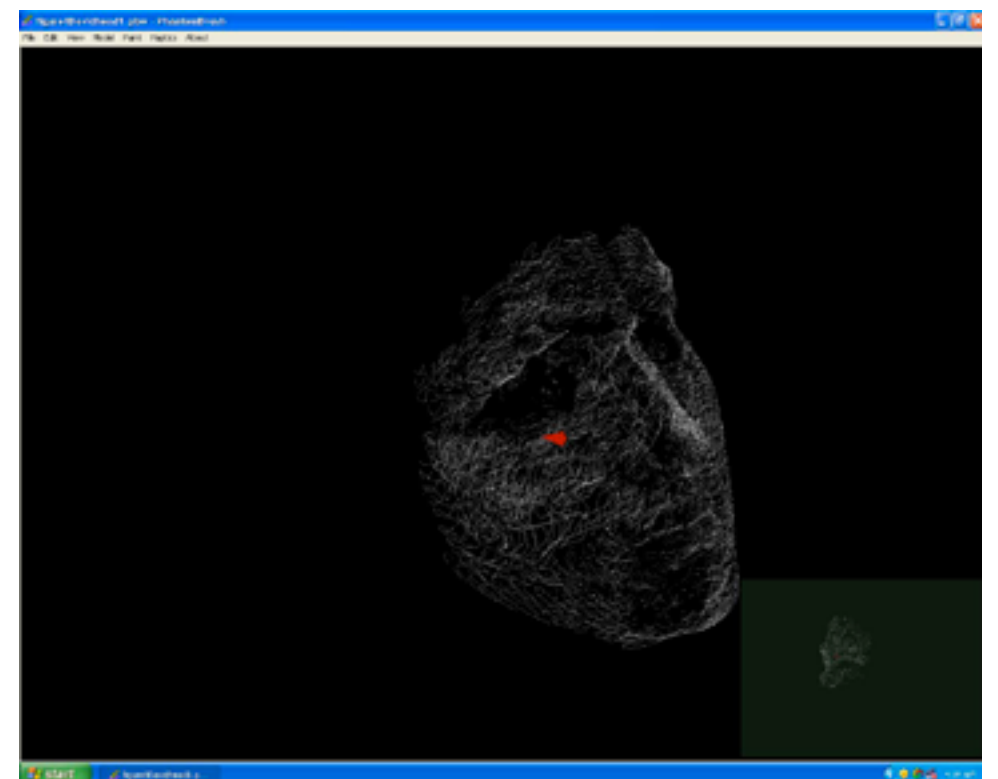
*Bottom left. Fig. 5 - Uniform lines drawn onto the mesh head of David*

asset for an art work but not in all cases.

Michelangelo's drawing approach offers potential to represent something, which is three-dimensional when viewed from many angles in the 3D environment. This is due to the large amount of hatching on the figure which follows contour lines around musculature rather than outline. Hatching for shadow is often interwoven into these contour lines in a very organic way. Dawson thought it might be possible to make convincing three-dimensional forms in holograms using this contour line method in conjunction with another of Michelangelo's techniques - sparse lines in some areas and high density lines in others. In this



way there may not not be a need for hidden line removal and the back and the front of the figure could possibly be seen simultaneously without too much confusion. This would be due to the low amount of lines describing certain areas of the figure, and this technique of using line



not to delineate the edge of a figure from a specific viewpoint, requires a different way of thinking about building up line. One of the primary ways of using line in traditional drawing practices is in etching where groups of lines are built up to suggest areas of shadow or to differentiate volume through the transitions of value.

In 2008 over a period of three months Dawson made studies from 40 of Michelangelo's drawings held in the collection of the Louvre in Paris. During this period Dawson closely observed and tested Michelangelo's practices and his attitude to mark making through pencil sketches. Through Dawson also attempted to emulate the line quality of the Michelangelo drawing using the Phantom and custom built software, using 3D templates from laser scans of Stanford University's digital Michelangelo project, this was not possible due to lack of skill in drawing in the 3D environment and the limited range of tools. (Dawson, Gage, Takatsuka, Goyette, 2009) However the research into Michelangelo's drawing processes confirmed for Dawson a link between an exceptionally large range, inflection and arrangement of marks to an experience of empathy and compassion when viewing the works.

In later years to assist three-dimensional hatching drawing, Takatsuka examined various forms of three-dimensional curves. Among those, we have found that spirals drawn on a surface of an egg yield desirable curves (Takatsuka, 2011). This spiral curve, however, needed to be computationally generated with different geometrical parameters. The most simple is the spiral, whose rotation axis is aligned with egg's longest bounding box axis and the interval between the lines is uniform as shown in Figure 6.

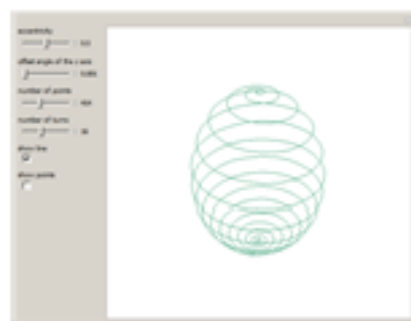


Fig. 6 - A uniform spiral curve on a surface of an egg

In order to generate three-dimensional curves, which are appropriate to describe natural body curves we needed to produce and egg shape having the rotation axis of the spiral as a curved line. This was first experimented only on the surface of a sphere in order to determine what sort of geometrical parameters needed to be used, as shown in Figure 7.

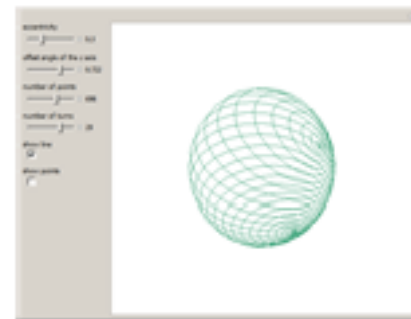


Fig. 7 - A spiral curve with the curved rotation axis on a surface of a sphere

Once the parameters to generate a spiral on the surface of an egg and the spiral on the surface of a sphere was implemented, two forms were combined to produce an arbitrary spiral curve, whose rotation axis is a curved line and the intervals between lines are changed depending on how the rotation axis is curved as shown in Figure 8.

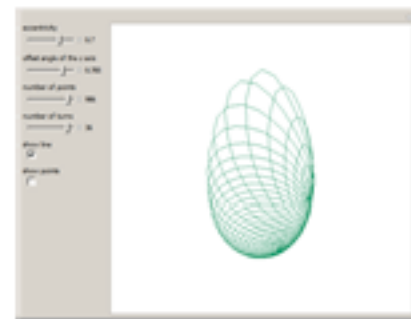


Fig. 8 - A spiral curve with the curved rotation axis on a surface of an arbitrary egg surface

The application of the spiral egg template is still in a developmental stage and though interest in Michelangelo's methods continue, emulating his methods of drawing is no longer a part of the project.

The final successful application *Holoshop: The design and evaluation of rapid 3D drawing technology for content creation in holograms and other three-dimensional displays* was written in 2009 for commencement in 2010 with new collaborators. The focus this time was more on the technical aspect of the project, both in the kind of perception of the final image and on practical means of output. The historical reference to Michelangelo was removed and Dr John Gage was not formally included on the application though he continued to work closely with the group. The new rewriting of the project emphasised the potential of this new drawing tool to be able to output to a whole range of other three dimensional display systems apart from holograms and how these would be perceived. The perceptual psychologist, Prof Richard Gregory, inventor of an early stereoscopic drawing machine using light, joined the project. Also, because of the new practical emphasis of the project on outputs

and because of the emphasis on the use of the drawing tool, particularly with holographic television. As holographic television does not yet exist, it was planned that in the early stages of the project computer generated holograms CGH, mathematically calculated in the same method as HoloTV would be used as a single still frame test of holographic television. Expert on the mathematical calculation of fringe patterns for computer generated holograms, Prof Hiroshi Yoshikawa, joined the project. Sadly, prior to the project commencing, Prof Richard Gregory died. Prof Brian Rogers, a former student, colleague and great friend of Richard Gregory, who is a perceptual psychologist specialising in stereo and motion parallax, joined the project which then commenced in 2011. Daniel Barry took over software development in the first year of the project followed briefly by Ben Sutas then John Stavrakakis until the present.

Holoshop, as it is now called, is currently in its third ARC funded year. The following two years of the Holoshop project will primarily be concerned with drawing in real time on HoloTV in collaboration with the Object Based Image Group at MIT Media Lab. However the work to date has focused on making static hand drawn 3D imagery. In this paper we will give an overview of the software, that has been developed and some recent examples of works which take advantage of the unique virtual tools of Holoshop, output as digital holograms, computer generated holograms and video.

Fig. 9 - Digital reflection hologram, *Hyperobject:Homeland* made from hundreds of line forms drawn by Dawson with Holoshop.



**HOLOSHOP TOOLS - software development**

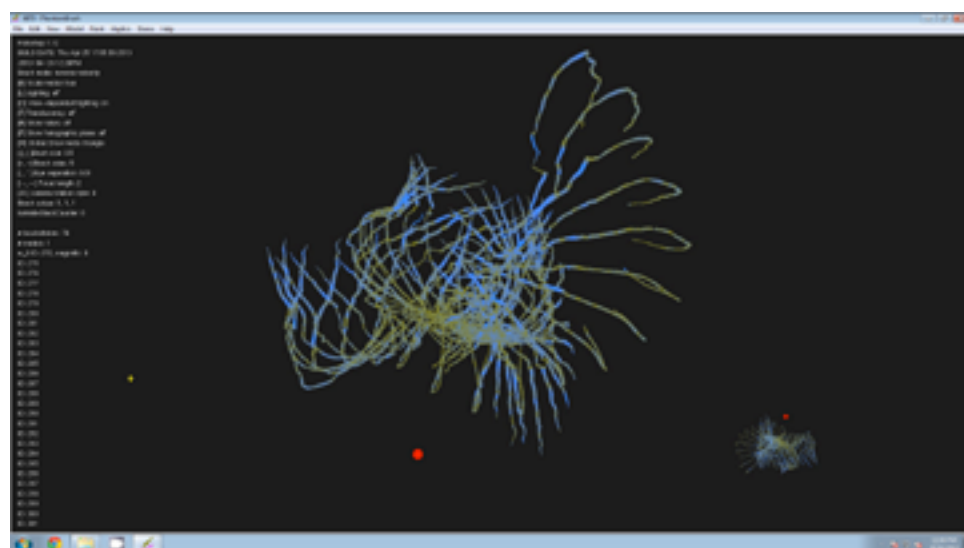
Over the past four years many functions to facilitate different types of “drawing” capabilities in Holoshop software have been developed. These functions were developed specifically to allow an artists to express and maintain their drawing activity in the form of “Line Quality”. In Holoshop, the line quality is primarily determined by the following obtained through the haptic device:

Speed: the speed of the tip of the haptic device in the haptic field,

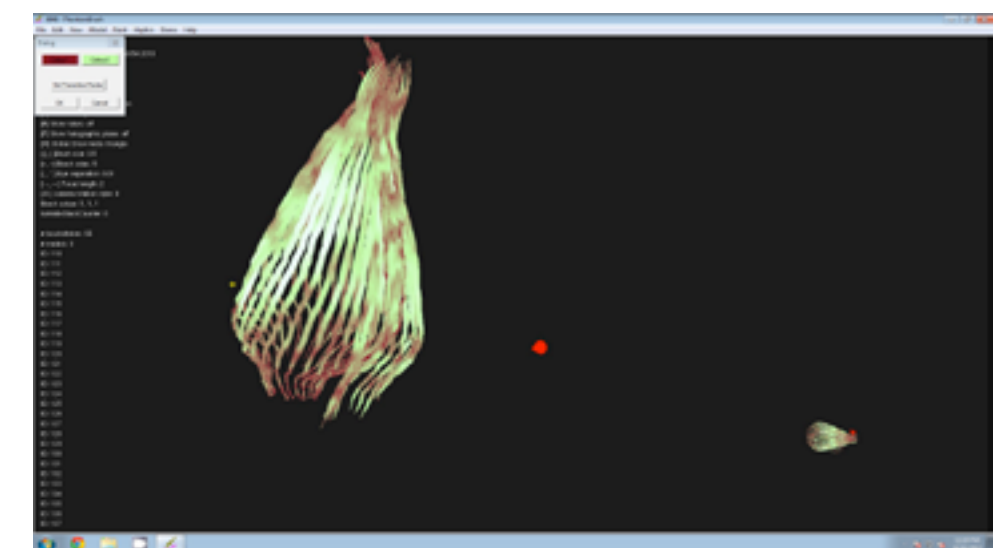
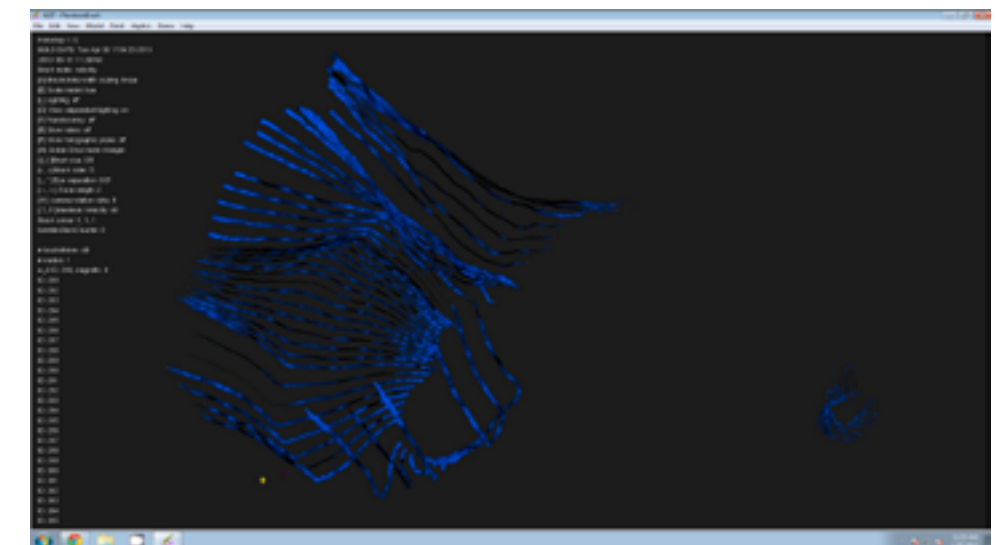
Orientation: the yaw, pitch and roll of the haptic device, which has a pen-like form.

Fig. 10 above and Fig. 11 below.

Fig. 12 Top right, Fig. 13 Middle right, Fig. 14 Bottom right.



Visual Attribute	Governing Physical Attributes
<p>Line Width</p> <p>Fig. 10 - Velocity mode line drawing</p> <p>Fig. 11 - Reverse Velocity line drawing</p>	<p>Speed (velocity) mode I: Faster the speed is, thinner the line width becomes</p> <p>Speed (reverse velocity) mode II: Faster the speed is, thicker the line width becomes,</p> <p>Uniform mode: regardless of the speed of the haptic device, a line has a constant line width.</p>
<p>Line Twists</p> <p>Fig. 12- Line twisting</p>	<p>The line orientation is determined by the orientation of the haptic device and the line will be twisted according to the orientation of the device. This twist will become prominent when the shape of the line is based on a polygon with low number of sides.</p>
<p>Line Shape</p> <p>Fig. 13 - Line with 5 brush sides</p>	<p>The shape of the cross section of a line is determined by the artist prior to drawing a line. For instance, a two-sided shape will yield a ribbon-like shape while a three-sided shape will yield a triangle line.</p>
<p>Line Colour</p> <p>Fig. 14 - line colour transitioning between reddish brown and green</p>	<p>Speed is used to transition between two colours. The maximum speed defined by the artist, is used to control the bias between the slow and fast colours.</p>



Pressure: the pressure, which the haptic device is pressed against a surface of an object,

These attributes associated with artist's physical movement are used to compute and produce the following "visual" attribute to express the line quality:

These can all be used in combination while drawing one object such as the linesforms made by Dawson which combine reverse velocity, velocity hue changes and difference in brush widths and sides.

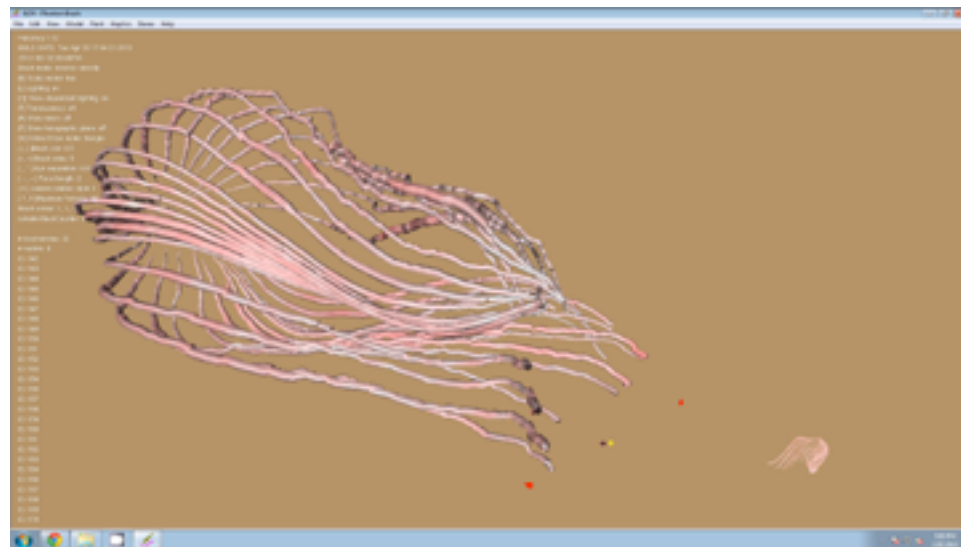


Fig. 15 - Lineform drawn by Dawson with mixed velocity, brush sides and hue

The Holoshop is also equipped with various functions, which assist in three-dimensional navigation. One of well-known problems in navigating through a digital three-dimensional space is a desert-fog problem. It is quite easy to get lost in this digital three-dimensional space when a user does not have sufficient visual and tactile cues, which act as reference points of navigation.

Another common problem is the lack of a supporting/guiding structure. When an artist draws something in the real world, a guiding surface can be used to rest artist's hand/arm to stabilize the movement of hand/arm. However, when an artist draws something in the visual three-dimensional world, such guiding surface is usually not present. Therefore, it is very difficult to draw something in the mid air (in the digital world) and/or against a surface of the digital object.

The Holoshop has navigational functions specifically designed to address these navigational challenges:

- desert-fog,
- lack of guiding objects

In order to provide navigational guide while an artist draw something along the surface of an object, the magnetic drawing mode has been included. This function makes the haptic pen/device become magnetically attached to the surface of the object. With this navigational assistance, the pressure being applied to the surface can be used to control the width of the line. In practice it has been found that the simplicity and smoothness of the mesh had been important as a very complex mesh with many polygons slows down the system and makes a lag between the time of moving the cursor and the time of seeing the movement on the screen. Though it is possible to use any types of 3D object as a template ranging from geometric solids to files from 123Dcatch, for recent project we have found templates made using Agisoft PhotoScan to be compatible with the Holoshop environment.

Over the past 3 years the majority of imagery produced using Holoshop has been the tracing of human lifelines from mesh templates of people's palms. (Dawson, Takatsuka, , 2012).

These templates have provided guidance for drawing in the 3D environment. In order to capture all the lines of the hand with great accuracy the first step was casting the hand in silicone. (Figures 16 & overleaf 17, 18)

The solutions provided by the Holoshop to address the desert-fog problem were implemented in the form of

- manipulation of view/haptic frustums,
- manipulation of rotational axes,
- provision of simulated rotation of lines.
- ruler/reference location

The haptic frustum is the 3D volume defining the limits of movement for the haptic pen. The movement translates to a position in the 3D visual space in Holoshop. This typically corresponds to a 1:1 mapping such that the distance moved with the haptic pen reflects the distance moved on screen. Given that the volume is fixed, there is a limited resolution of sensitivity that can be achieved by moving the haptic pen. This limits the expression of very large and very small movements. Such a restriction means that the smallest movement is limited to the relative motion of the pen in the physical space.

Fig. 16 - Dr John Gage with Dr Edi Pucci as her palm is cast in silicone



The changeable haptic frustum allows the artist to change the direct 1:1 mapping of real world physical movement to the perceived virtual movement. Having a larger haptic frustum allows small physical movements to translate as large virtual movements. Conversely, a small haptic frustum can allow much greater precision in a virtual space even with large physical movements. The artist can scale the haptic frustum to suite the activity, small frustum allows very delicate and detailed lines to be drawn within a small surface area, while the large frustum allows the artist to draw single uninterrupted line that is present in all parts of the scene.

The visual frustum can vary to create a similar effect of scale. The camera is located at a position in the 3D space. The frustum dictates how the virtual space is rendered onto the screen. One attribute for defining the shape of the frustum is the field of view, which is synonymous with zoom. Thresholds of depth can be defined for hiding very distant and very near objects in the scene. This aids in the removal of unwanted detail when working in a narrow and focused task.

#### Rotation Axis

To compose a scene, a 3D template is used as a basis for drawing lines. These lines can be drawn in fixed positions relative to the template as





Fig. 17- the silicone cast of Dr Edi Pucci's palm

the scene. Another kind of scene can be composed of many lines, which have no fixed position relative to the template. These lines are drawn by repositioning the template in successive steps at the time of drawing.

An example of such a scene is to create an enclosed surface defined by the lines themselves. For each line, the template needs to move to a new location and orientation such that the line drawn in place serves as part of the enclosed surface.

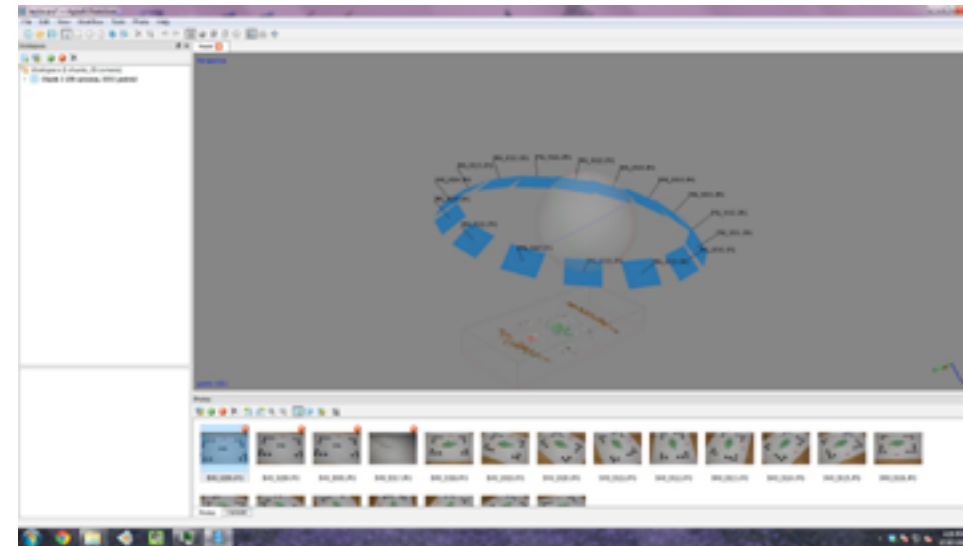
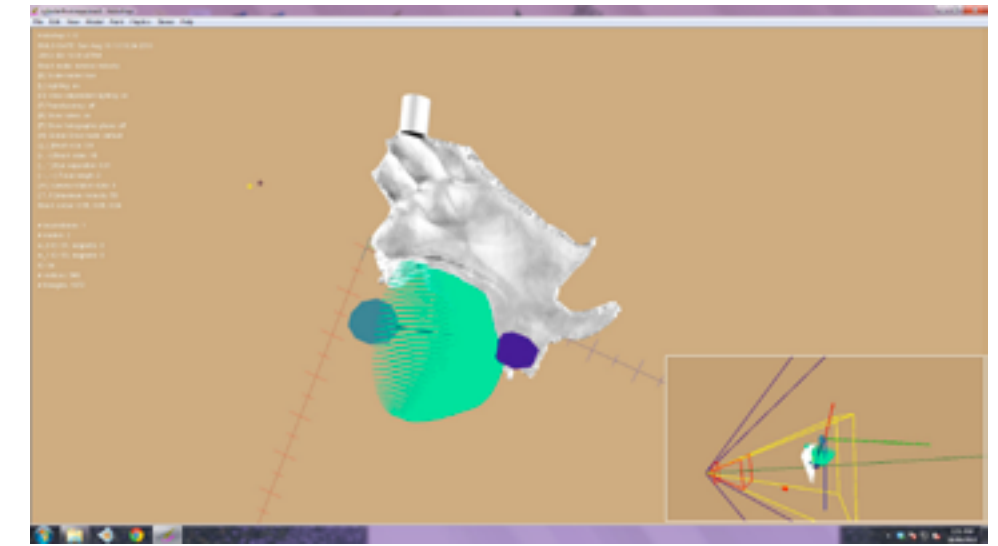


Fig. 18 - photographs taken from around the palm cast assembled in agisoft

To aid this process, an arbitrary rotation axis can be defined to move the template into the next successive step. The rotation axis defines a single line for which the template will rotate around. As an arbitrary rotation axis, there are two endpoints of the line that can be manipulated to satisfy any possible 3D orientation. The movement of the rotation axis itself controls the distance to the line being drawn. This defines the interior size of the enclosure. By changing the distance from the rotation axis after a number of successive steps, the inner size of the enclosed surface can vary. The rotation axis tool allows control of the

Fig. 19 - In the inset window the Haptic Frustum is shown in Yellow at a different size from View Frustum which is shown in Blue

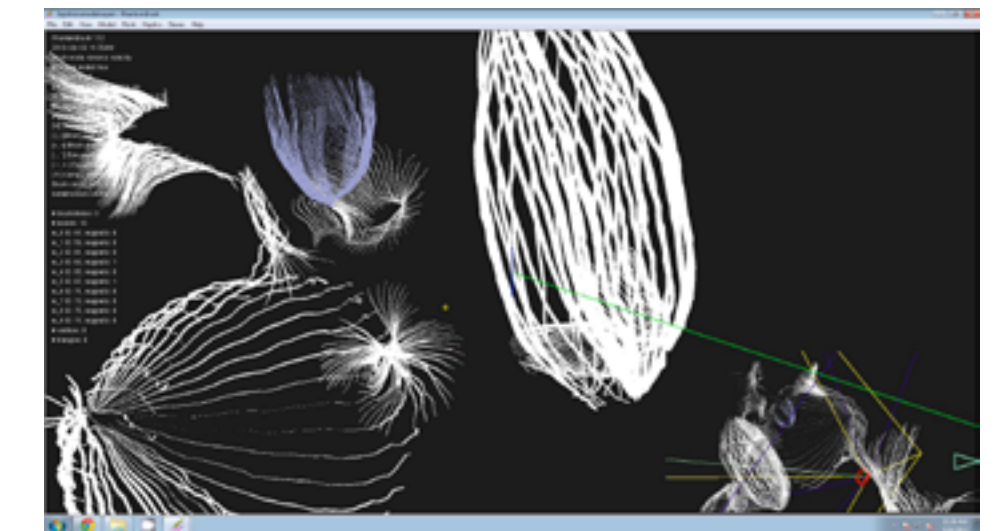


[Dawson\_DrawinHoloshopfigure20.tif]- Rotation axis seen in respect to a line drawn along the lifeline of a palm template]

how far the successive step will be, in degrees, for creating sparse or dense enclosures. All such components of the rotation axis: the end-points, axis location, step size, can be changed at the time of drawing. This flexibility allows the composition of an enclosed surface without fixed conditions.

The composition of an enclosed surface is a time consuming process. The rotation axis tool can help produce the final structure, however, the outcome of the structure is not known until it is completed. It is not easy

Dawson\_DrawinHoloshopfigure21.tif- Lineform drawn by Dawson along the lifelines of palms each with different axes of Rotation



to conceive how a line drawn in 3D space, to then be rotated around an axis in a certain number of steps will appear. To address this problem, a pre-visualisation of the resulting structure of lines is shown to the artist. The pre-visualisation performs rotation of the template and draws the line in the location as defined by the parameters of the rotation axis. The lines being drawn are a duplication of the most recently produced. This guide serves the artist to see how the structure will appear if they were to follow the parameters of the current rotation axis. By adjusting these parameters of rotation axis, the pre-visualisation also updates in real-time. The previsualization cannot be used to foresee the variations of the lines produced by the artist, it does however conserve time by illustrating a structure that may contain undesirable features from the parameters chosen.

#### Ruler/reference point

As a void 3D space, there is no reference to the origin or landmark location for the artist to use for navigation. Two landmarks for position and navigation control are used. The ruler is defined at the origin location and displays the 3D axes using different colours to indicate the orientation of the camera views relative to the world. The world rotation reference point is a location in 3D space that defines the pivot for all camera rotations. As the scene becomes more complex, the focus of work is at different locations and different surface areas. This demands that the camera navigation adjust to the context of work. This has been indicated by a small wire sphere and can be changed by using the haptic pen.

#### Exporting Drawings from Holoshop

The same scene made in Holoshop can be exported in many forms for example the drawing of a nest of lifelines from the palm of Dr Edi Pucci hand has been exported as a 3D print, digital hologram, computer generated hologram and as a character in an animation.

The 3D print was made at life size so when installed the handmade three-dimensional line from Holoshop were tapered to approximately .3 mm. (Fig. 22)

The image when exported as a CGH computer generated hologram was 3 mm square and the image was projected onto a screen smaller than life size. (Fig. 23 & overleaf Fig. 24)

Exported without the palm the nest was incorporated as one of the many line forms in the digital hologram Hyperobject: Homeland. (Overleaf



Fig. 22 - Nest of Lifelines, SLA 3D print, 2013

Fig. 25)

The nest also featured in a 20 second animation of the line forms Death as a Mirror of Life, 2013. (Overleaf Fig. 26)

#### New Paradigm

Generally, in two-dimensional drawing, there is a support, which is static. Even in Holoshop, which enables three-dimensional drawing in space we have intentionally reintroduced this relationship of medium and support though the ability to use three-dimensional templates which can be placed in static positions within a static three-dimensional world.

Using Holoshop software and the Phantom interface it is also possible to generate drawings in experientially different ways. Earlier we explained that it is possible to draw in 3D space with the feeling of not having a support at all with Holoshop and that this scenario of drawing without resistance is common to many 3D drawing types such as skywriting, drawing with a torch, polemus tracker or wand etc.

Apart from these two scenarios of drawing on a static support and drawing without a support in space, though Holoshop, it is possible to

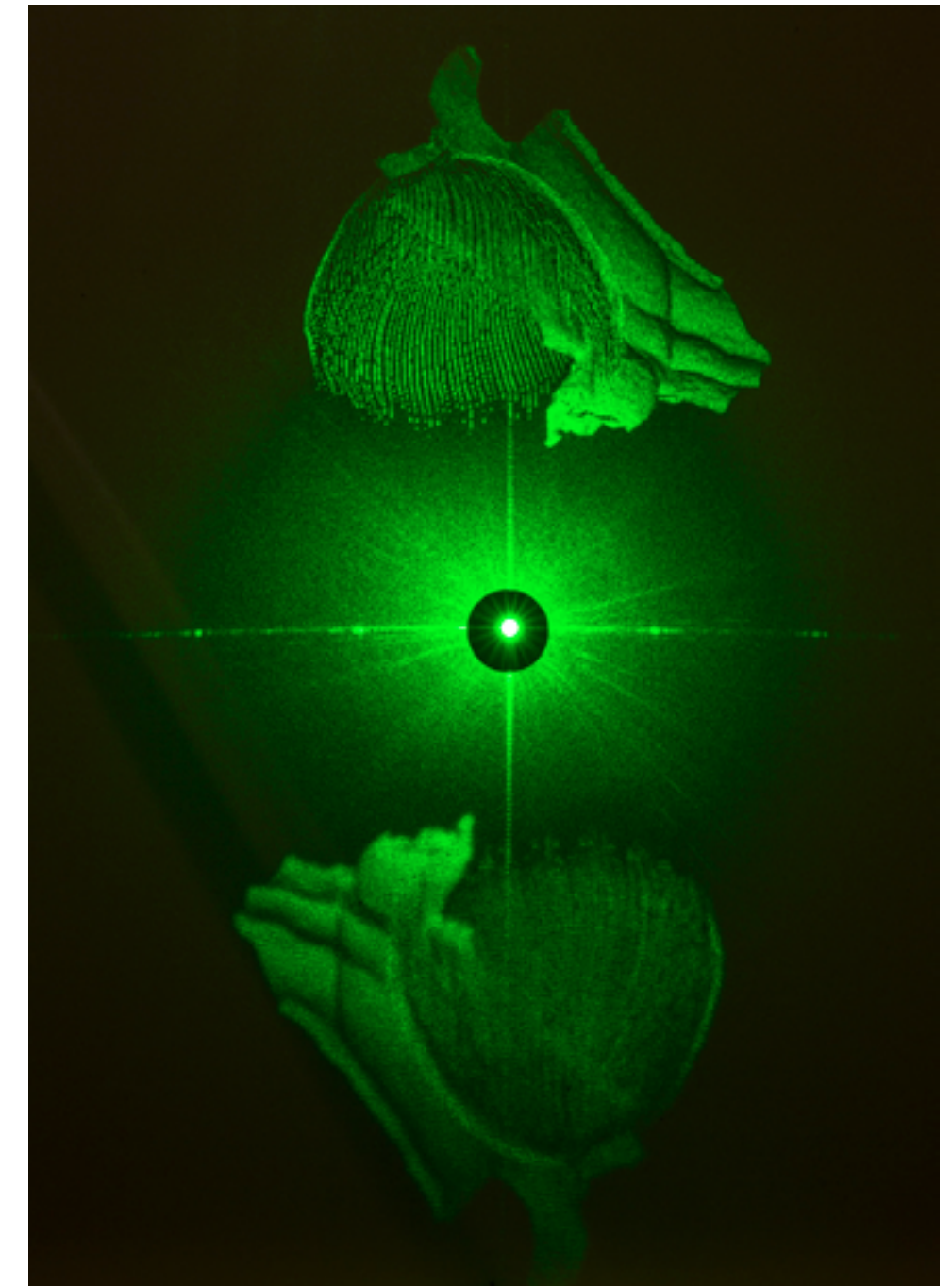


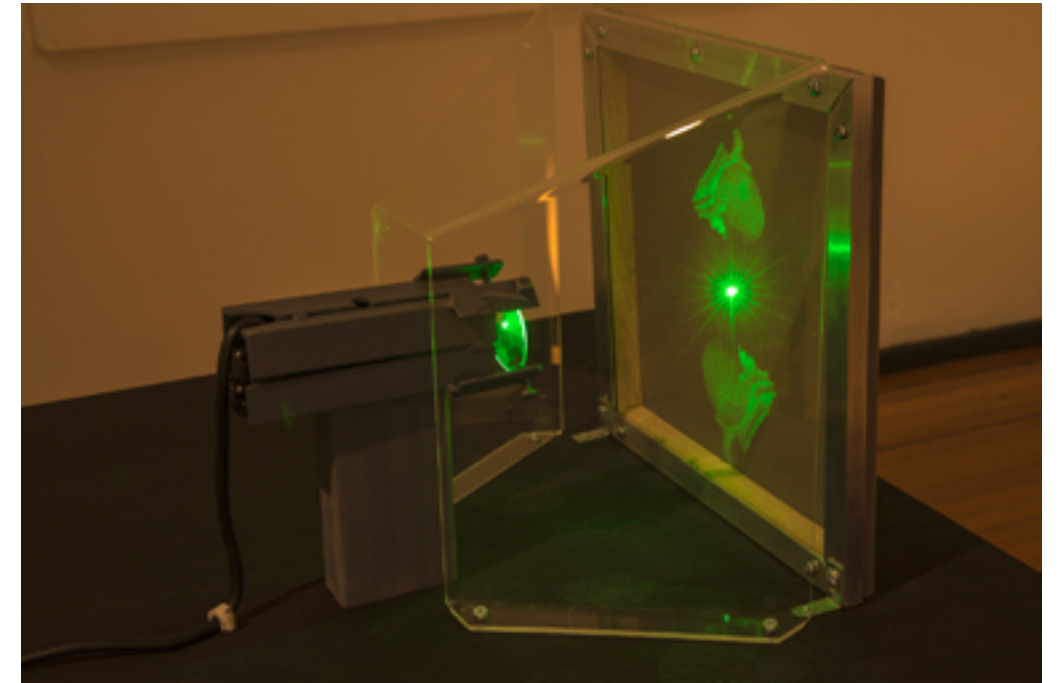
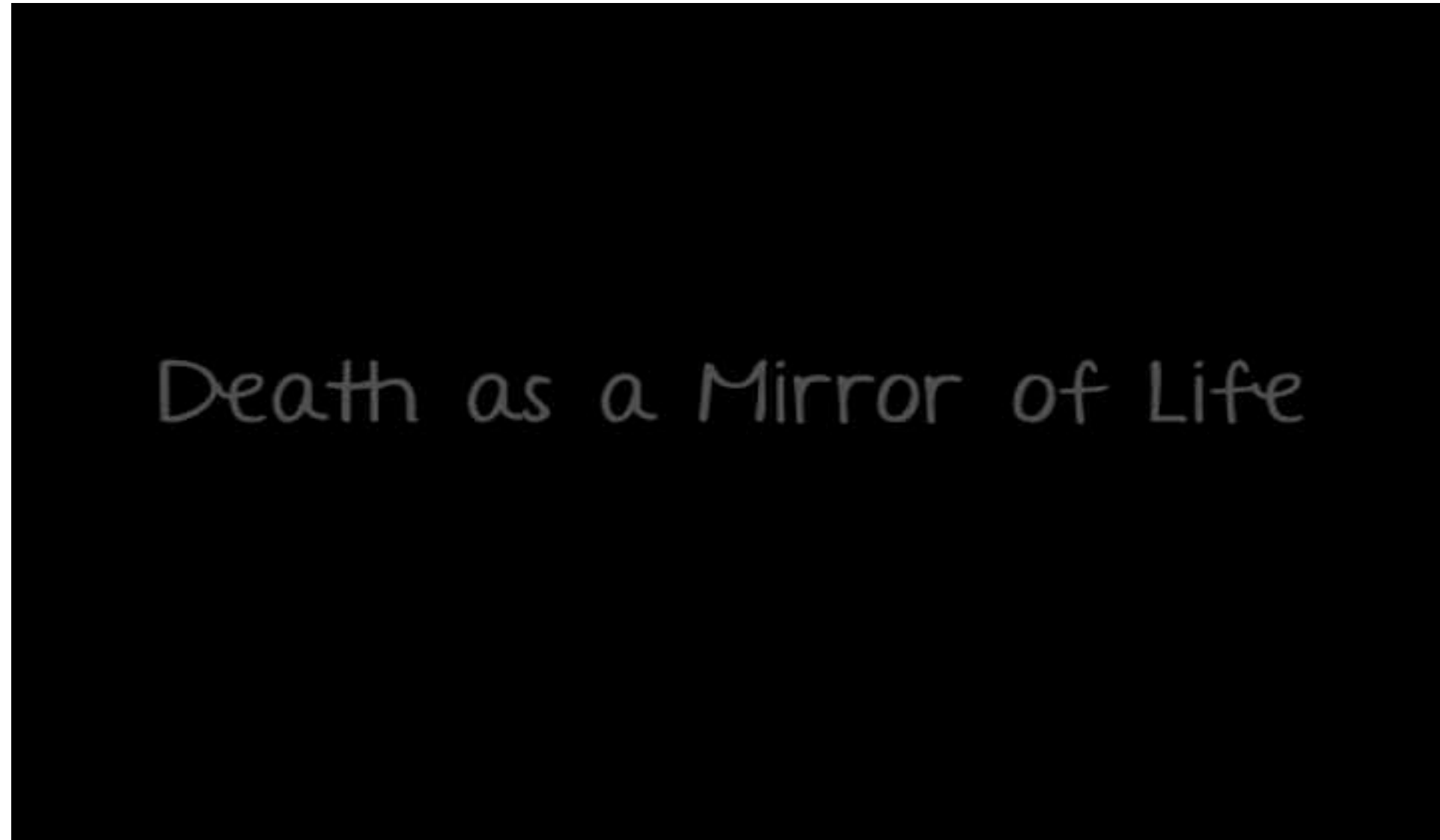
Fig. 23 - Nest: Palm Attached, computer generated hologram CGH 3 x 3 mm, 2013

experience a third scenario in which the space is generative in drawing. This new paradigm of drawing gives precedence to the gesture of space in which the line emerges. An Ontology of Space is revealed through the combined gestures of space and the drawing within that space which occur concurrently.

Fig. 24 - Nest:Palm Attached, computer generated hologram CGH 3 x 3 mm with laser,2013

Fig. 25 - Hyperobject:Homeland, 1.2 x 1.2 meter digital hologram, 2013]

Fig. 26 (video) - Death as a Mirror of Life, 20 second stereo animation, 2013



The way in which this third drawing modality with Holoshop takes place is that the Phantom pen is held and moved around and simultaneously the mouse, which controls the viewpoint from which the drawing is going to be made, is moved. This change of viewpoint has the effect of pulling the space away from the cursor where the line is going to be drawn. A type of current is generated from the tip of the pen pulling it around in the direction of the mouse. The position of the mouse always occupies a particular position on a sphere of varying diameter according to the zoom factor out from the origin of the virtual computer

graphic world.

This type of drawing results in a very fast generative process, considerably faster than drawing with the pen into static space. By experiencing and viewing this process it's possible to imagine events in cosmological scale space in which the movement of space itself is a generative factor and impacts on physical entities that are shaped or come into existence because of its motion.

In this new paradigm, the relative importance of the gesture of the mouse hand which moves the space is greater in its impact on the draw-

*Fig. 27 -Ontology of Space, 3 minute real-time screen video of Dawson drawing with the Haptic cursor and mouse in Holoshop,2013]*

## Ontology of Space

ing than the gesture of the line drawing hand which exists within that context. The scaling of the amount of space that the mouse hand controls is variable through various technical mouse functions, however the perceptual difference in the amount of change that takes place in the drawing by moving the mouse is substantially greater. The two integral simultaneous gestures of two hands interweaving both the space and the line together, author the drawing.

Technically, this mode of drawing is the result of collaboration between two different space navigation (drawing with the phantom pen) and manipulation (moving the space with the mouse) functions within the Holoshop drawing environment. The resulting line implicitly expresses spatial coexistence and collaboration of these two activities.

### Conclusion

The small but adaptable range of virtual tools developed in Holoshop were shown to offer potential diverse range of modes of drawing expression in 3D digital space through a range of examples of artworks exported from Holoshop as digital holograms, computer generated holograms and SLA digital print. The Holoshop project group have developed various techniques described in this paper in order to facilitate and support rich line quality. The paper examines the difference between drawing in 3D with and without a support and various haptic relationships between the Phantom pen and virtual support templates. The paper also introduces a new paradigm in drawing though which active space, rather than a passive support or neutral passive space, provides the context for the appearance of the line drawing. Being able to continuously orientate space though gesture as the line emerges become the generative dimension in which an interweaving of line and space drawing takes place.

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# Dos Santos | TRANSLATIONS 4a/b.2013

## (a drawing project and a reflection on tracing)

### Abstract

Seeing and drawing are two interconnected actions essential to the understanding of tracing using drawing and seeing machines. This text focus on the subject of drawing using a digital drawing machine created after the study of the Camera Obscura and the Camera Lucida. Along with the description of the machine, it is presented a system of recognition, prediction and expectation, at the core of the machine, constraining the drawer's actions of seeing and drawing. The saccadic eye movements are a metaphor for this system, relating the drawer and observer to the machine during the act of drawing and during the translations operated by the machine, according to the interpretation of data collected from the drawer's gestural inputs. These translations can augment the drawer's perception of his drawing as an act inscribed in a time interval. The use of a computer to mediate the act of drawing will be presented as a possible enhancer of the amplitude of the act of drawing. The operations and transdisciplinarity of the device are the subjects of this text. As a conclusion, I propose that drawing practice is a never-ending process that develops as a modular system in which this machine has its place(s).

### Biographical Details

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I concluded a Phd in Visual Arts and Intermedia – Drawing, at the Polytechnic University of Valencia with the thesis "Estudio teórico-práctico de la Camera Obscura y de la Camera Lucida. Una nueva propuesta de máquina de dibujo digital", where I explore the theme of drawing and seeing using machines, for the creation of a digital drawing machine, actually it evolved to the ongoing project named Translations.

My main areas of interest are related to drawing and seeing using

drawing machines; tracing and the exploration of possible uses for the digital mediation of drawing. The drawing materials and their relation to the procedures and the production of drawings is another area of interest that informs my drawing practice.

As practitioner, I've been showing my work regularly since 1990.

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### Introduction

"The fundamental problem of vision: the image at the eye has countless possible interpretations." (Hoffman 1999, 13).

By stating this problem, Hoffman is pointing to the necessity for the existence of "rules of universal vision" (Hoffman 1999, 14); as we well know, at least from our everyday life experience, there is a common ground for the interpretation of what we see, and this consensus means that all the other possible interpretations that are left out are submitted to a restriction process that can be called visual process, or, as Hoffman suggests, "rules of visual processing" (Hoffman 1999, 15). All these rules mean that it is possible to live together, sharing a common view of the world, without excluding the countless possible interpretations that are unique to each one of us.

The drawing practice is a way to explore these differences, and I propose that tracing can be a method for the exploration of the different ways of seeing, or constructing the visual world, hidden in the rules of visual processing.

When tracing, each drawer creates his own drawing and, apart from each one's drawing skills, there are no two equal drawings for the same traced subject. There is a recognition-prediction-expectation system characterizing each of the drawer's actions. I will return to this system later on this text.

There are some tracing techniques that I think are more interesting than the tracing paper namely the Camera Obscura and the Camera Lucida, in which the whole device frames the act of drawing in relation to the thing/subject being copied in a manner that affects the drawer's disposition and perception.

This is not the place to write about the similarities and dissimilarities of both devices; what is important to note is that they act on the drawer, turning him into an active participant in the tracing process. The two

machines engage the drawer in a layered attentive looking process: they produce an image that is to be processed in parts and as a whole; as a construction of meaning, following a framing path dependent on each one's goals towards stability (or personal biases); and both machines put the drawer on a duration interval, in which his subjective perception of duration is suspended, or altered. I believe that by using these tracing machines, the act of drawing becomes an insightful act, as opposed to the 'dumb' action usually connoted with tracing.

It has been with these thoughts in mind that I created and developed a modular digital drawing machine that is the subject of the present text.



Fig. 1 – The image to be traced, with a tracing paper on it, and four drawings made by four different students.

### The digital drawing machine

Data interpretation in visual information is processed in a translation movement in and between the observer and the visual thing or subject.

The current project is a reflection on this movement and on how computers can be used to augment its perception.

The digital drawing machine can be a useful research tool on the act of drawing as a performative gesture inscribed in a time interval.

Translations 4a/b.2013 is a modular digital device that works as a drawing (tracing) machine and as a drawing's construction machine based on data interpretation collected from other drawings. The first module is called the input module, and the second one is called the translations module. Both modules depend on someone drawing in order to exist.

#### *The input module*

The drawer acts by tracing an image on a screen. That image can be captured in real time by a camera or pulled from the computer's hard-drive.

The digital mediation of the tracing act augments the drawer's experience of seeing and drawing. This section of the text is about that experience.

The translations evoked by the title of the work are related to the fact that the device is comprised of an analog to digital input module, manipulated by a drawer using an ink pen over a paper, as interface; and by a digital processing module (programmed in Pure Data) that will interpret each position of the pen's tip, converting it into the image

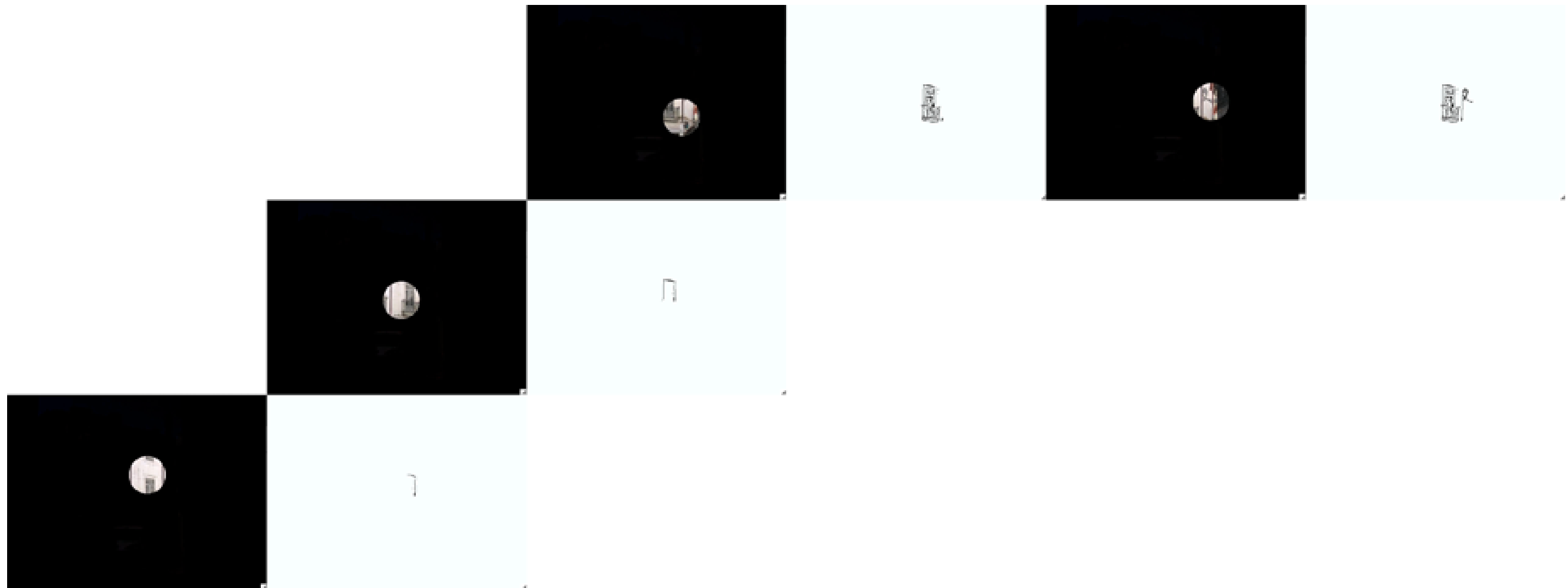
of a point in a line; the computer is also programmed to convert the position of these points into two text files (one for the x's and one for the y's), written into the computer's hard-drive; there is a third text file being written into the computer, with the time intervals between each point (measured in milliseconds).

Deanna Petherbridge refers this understanding of the line as a time and space referent in a digital dimension, in her book *The Primacy of Drawing*:

“The basic units of lines, marks and traces and the way they relate to each other and to the support materials on which they are deployed constitute the primary aspect of the linear economy. They are made by hand using very simple drawing instruments, and also in the technological extension of drawing in analogical and digital computer

Fig. 2 – The input module as a visual search or scanning module.

Fig. 3 (overleaf) – The digital drawing machine components.



software, which approximates linearity (long sequences of clustered pixels) as if made with a simple tool.”(Petherbridge 2010, 88)

In the present case, the line is presented to the drawer as an image, with each of its points being displayed as its position on the screen, without being submitted to a smoothing process (the line appears as is).

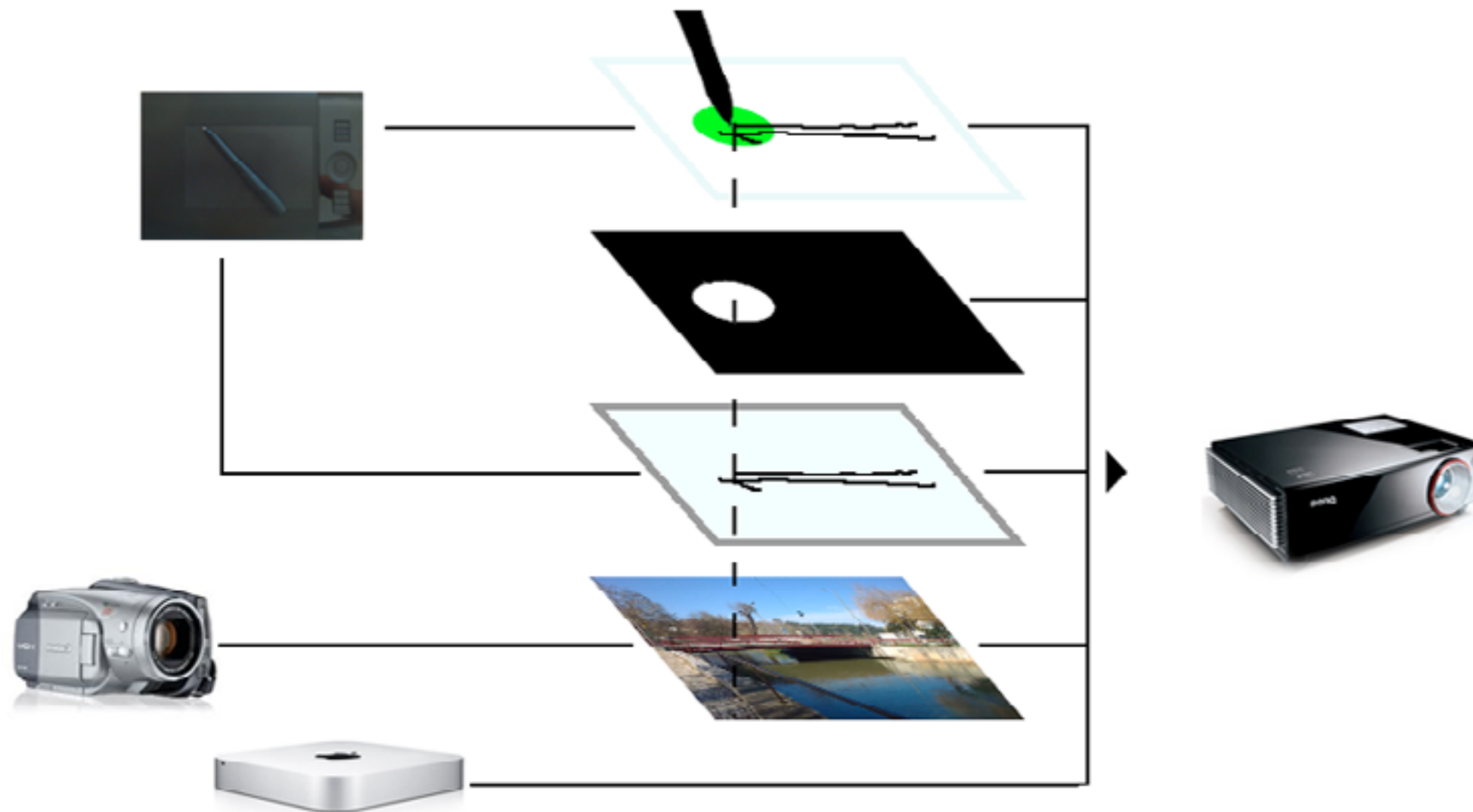
The drawing interface is comprised of a digital tablet and an ink pen. Knowing that most people react to this kind of analog-to-digital interfaces as facilitators of their actions – usually, these things are used with software that adapts the user’s gestures to his expectations (Santos 2012, 375-377).

“Las imágenes vectoriales de los dibujos realizadas por otros programas

de dibujo rectifican y corrigen inmediatamente nuestros trazos imposibilitando la constatación de nuestros errores (...) La fascinación por la apariencia de los resultados, por la terminación ‘profesional’ de los mismos y por la sensación, sólo aparente, de que las nuevas técnicas proporcionan a los principiantes un ahorro de esfuerzo, hace que muchos nuevos dibujantes no estén dispuestos al combate que exige el antiguo dibujo, ignorando que la constatación de la dificultad, la distancia entre deseo y realidad es el auténtico territorio de la idea.” (Molina 2005, 23)

[Vector images of drawings made with the use of drawing programs, automatically rectify and correct our traces, turning the realization of our own mistakes into an impossible task (...). The fascination with the apparent results, for its ‘professional’ finishing and by the sensation, only in appearance, that these new techniques allow its users a saving of effort, makes many new drawers unwilling to the fight demanded by old drawing, ignoring that the finding of the difficulties, the distance

Fig. 3 – The digital drawing machine components.



between desire and reality is the true territory of the idea. (my translation)]

During the development of the machine it became necessary to create a wrapping that would drive the drawer’s attention into the act of drawing – this is a complex issue that won’t be more explored in the present text; two things are necessary: first, the pen must leave a mark on the surface it touches, and for that it is necessary an ink pen that is recognized by the tablet; secondly, the tablet must be hidden, and for that purpose I designed a hollow drawing board in which the tablet is placed and on which the drawing paper is marked with the drawer’s gestures.

Fig. 4 Overleaf – Before and after the ink pen manipulation. Foveal area simulation.

The drawer starts his drawing with a glimpse of what he is about to trace, because as he touches the paper’s surface with the ink pen, the screen is filled with a black rectangle covering the image, and it is only by the action of starting to draw, signaled by the displacement of the pen’s tip on the drawing surface, that he discovers (or uncovers) a circular area of the image (with a dimension proportional to that of the human vision’s foveal area), with its center at the pen’s tip position. This circle can be understood in an analogy to the Camera Lucida’s eyepiece, and it moves synchronously with the pen, or independently from it, depending on the drawer’s choices while manipulating the interface, discovering new image areas at the same time it covers the previous ones. Two rotary buttons were added to the drawing board so that the drawer can manipulate the transparent circle independently from the motions of the pen. These are used as in the etch-a-sketch drawing machine.

The following description on the functioning of the drawing (input) module is taken from the article “A drawing machine described through a discussion on the functioning of the Camera Lucida” (Santos 2013, 190-197):

“The drawer will act according to his predictions, based on what the marks he chooses to trace denote, allowing him to guess a visual framing for the scene. This choice is part of a visual search process, meaning that the drawer also chooses not to trace some marks. The selection process, in this case, blends with the visual search process.

The dark layer, with which the drawer is faced, corresponds to a curtain or shadow projected over the image to be traced, and, in fact, in the used software for this mediation, a black layer is imposed on the image.

Fig. 4 Overleaf – Before and after the ink pen manipulation. Foveal area simulation.

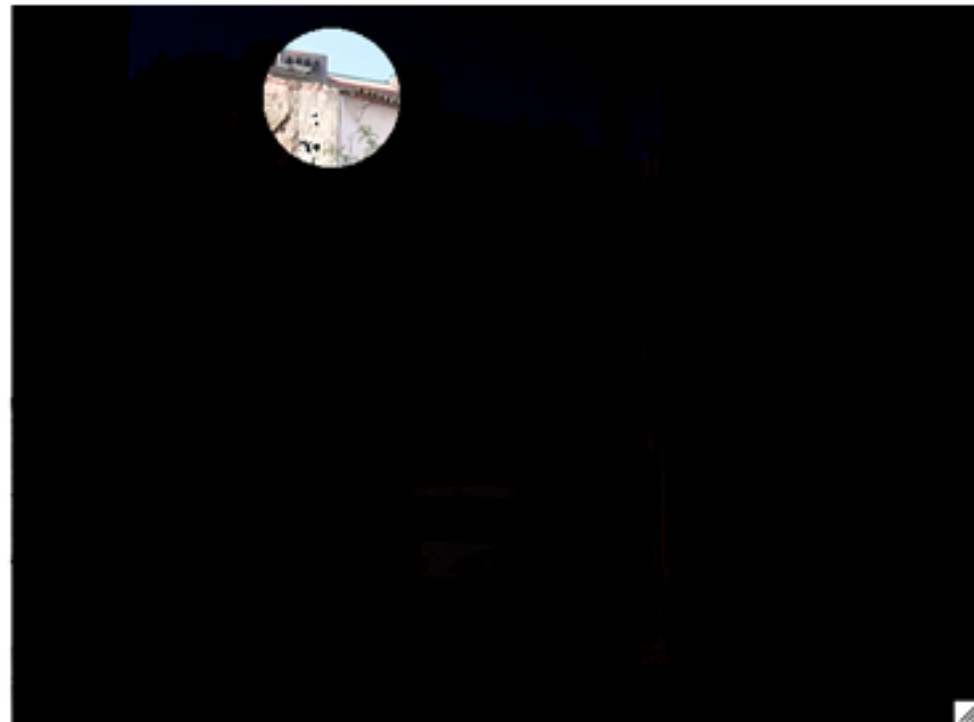
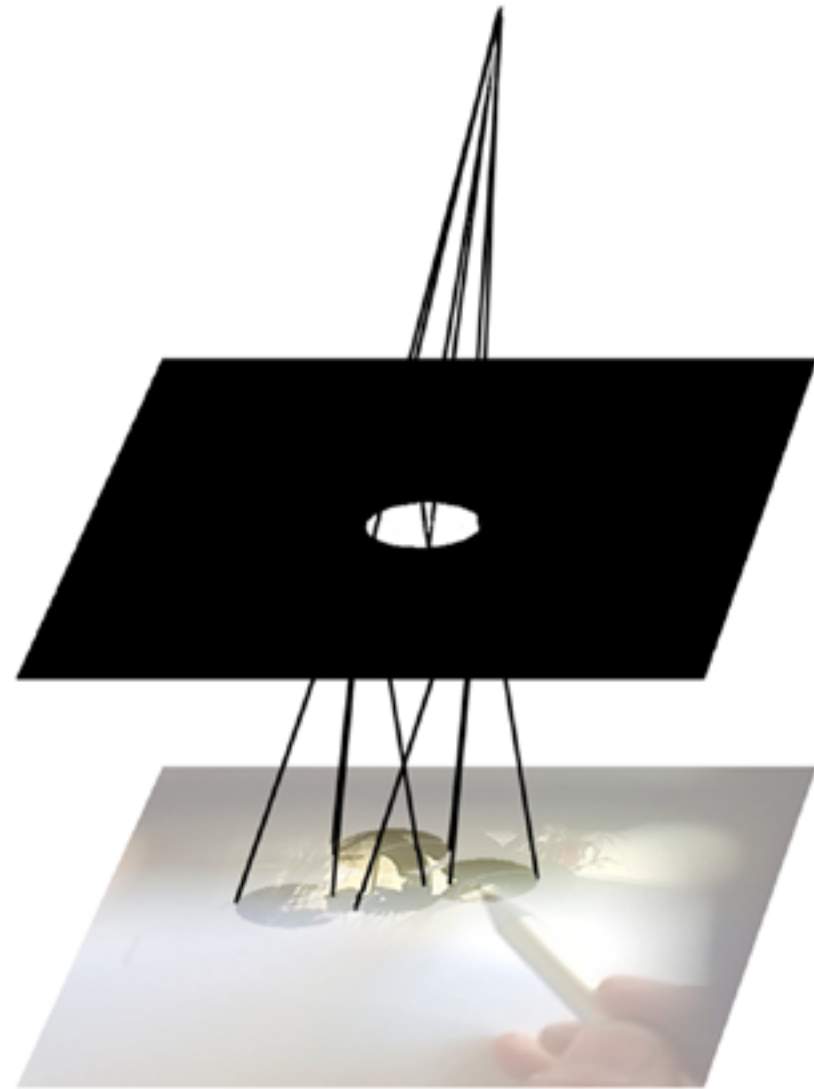


Fig. 4 Overleaf – Before and after the ink pen manipulation. Foveal area simulation.





[Santos-figure 5 – Peeping through the Camera Lucida, extending the visual field.]

By moving the ink pen, the drawer traces over the image, or to describe it correctly, he traces over a transparent layer placed between the black layer and a layer in which the image is placed, and by moving the pencil he moves a black alpha circle embedded in the black layer, making it transparent at its position. This way, the motion of the pen will turn visible one area of the image after the other. That is, the movement of the circle will unveil one area while veils the previous one. For the drawer, it is a process of discovering and recognition of the parts of the image that he is drawing and, at the same time, he is drawing and creating a connection system allowing him to recognize the parts of the whole (or composition, arranged according to the visual framing) that he is drawing.

While in this process, the drawer isn't left without any physical trace or

memory of his selections, the drawing surface registers all his drawing actions, and can be considered as a map in which the recognition of his marks can be useful on the imaging of a visual framing orienting the future actions. The drawing on the paper can be viewed as a denotation surface generating recognition and predictions.

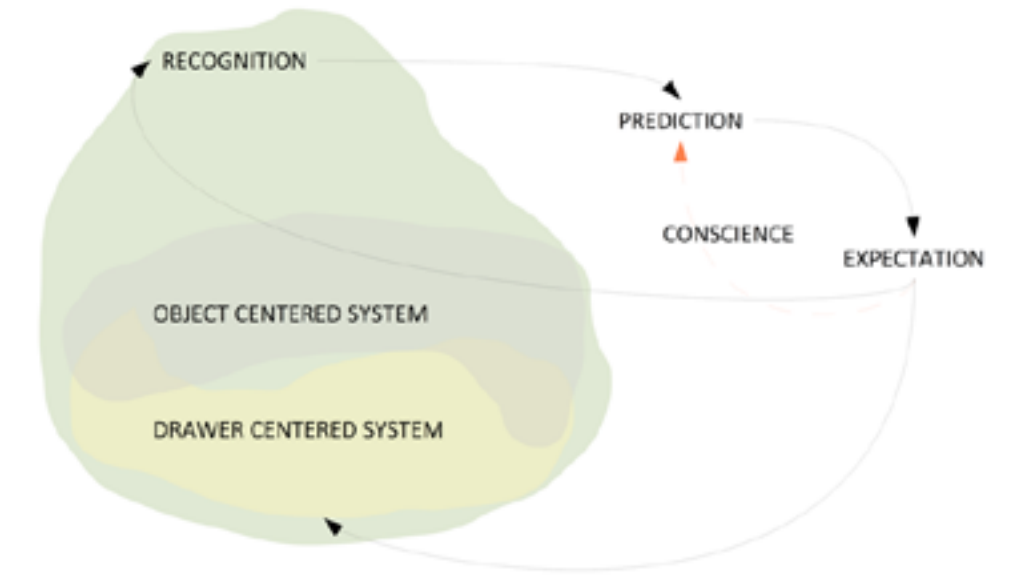
(...) This imposes some difficulties on the drawing process by allowing the possibility of showing chunks of the image that aren't recognizable as being part of something [marks or areas], thus obstructing the prediction and the conscious [driven by expectation] movement of the pen. If there is no recognition, it gets impossible for the drawer to know which marks to select, and the selection process is crucial for the continuity of the drawing."

["That it is possible to do this there is no doubt; but, when done, it will produce something very different from the spirited or, true sketch of an artist, since the whole must be effected by the tremulous creeping movement of the hand, feeling its way in twilight, rather than firmly representing that which the artist sees." (Sheldrake 1810, 176)]

"(...) [There is another] hidden restriction in action, [that I noticed] while observing my students using the digital machine for drawing, the size of the projection changes the scale in which the drawing is executed, producing changes in the drawing process by showing the drawer an amplification of the trembling of his hand, represented by the character of the line drawn – analogous to the "tremulous creeping movement of the hand" described by Sheldrake on the use of the Camera Lucida. This amplification of the apparent line produces unease in the drawer, which doesn't recognize the trace as a product of his gesture, or worse, starts doubting of his capabilities as a skilled drawer. The way to stop this unease is by looking at the paper in which the drawing is taking its material form. By doing this, the drawer adapts his mind to the physical scale of the drawing and, pacified, continues the drawing. It is noticeable that people with few drawing skills or experience, don't look at the paper where they are making the drawing with the pen, and this screen fixation will break their motivation, putting an end to the process. (...) The digital machine for drawing proposes an exploration of reality mediated via a drawing processed through the examination of its parts, by the search of its continuity and consistency. This is a unique procedure for each drawer, which means that each drawing expresses a point of view framed by the conditions of its making."

There is one last restriction common to all tracing drawings; it is the absence of an expressive line. The drawing's character, the traits of its maker, will be noticed in the extraction and selection processes, reflecting the drawer's mind during the act of drawing.

The drawing process is based on the recognition of the marks visible to the drawer, since the image to be traced is covered by a black layer



Santos-figure 6 – The recognition-prediction-expectation system.

(veil), and the only visible part of it corresponds to a transparent circle around the tip of the pen (cursor on the screen). By using his recognition system, the drawer is able to select the marks that he believes to be of importance (salient) to the making of the drawing as a whole, this way the drawing process becomes a three step system comprising the recognition of the parts, the prediction of its connection to a visual scene and the expectation of the correctness of the prediction. This process happens again and again; as a visual search if the expectations are right, or as a visual scanning if they are not – this motion, required for and from the drawer's gestures, is similar to the ones present in our saccadic eye movements, in which continuity is constructed between fixations, according to a prediction rule dictated and tested by the visual system. (Fig. 7 overleaf)

Three drawings result from this drawing process: the drawing made on paper, the drawing on the screen and the image saved on the computer's hard-drive; only the first drawing will be known to the drawer, the others will hide from his view: the drawing on the screen as the resulting image or visual feedback of the drawer's gestures will be converted into text files, and its end image will be printed into an image file.



Fig. 7 – Original drawing 1: ink pen on paper.

**The translations module 1 – recognizing a hidden drawing**

“By freeing drawing from its utilitarian role, the camera, as the ultimate mimetic machine (whose verity is, of course, radically challenged today) provided the opportunity for a re-evaluation of the mimetic function of drawing. As argued by Charles-Blanc, twice director of the Ecole des Beaux-Arts and the instigator of the Musée des Copies: “What is drawing? Is it a pure imitation of form? If so, the most faithful of all drawings should be the best; then no copy would be preferable to the image fixed on the daguerreotype plate, or traced mechanically... But neither of these instruments gives us a drawing comparable to that which Leonardo da Vinci or Michael Angelo would have made. The most exact imitation, then, after all, is not the most faithful, and the machine in seizing the real does not always catch the true. Why? Because drawing

is not a simple imitation, a copy corresponding mathematically to the original, an art reproduction, a pleonasm. Drawing is a work of the mind.” (Petherbridge 2010, 281)

This module is responsible for translating the text files for the recovering of the ‘absent’ drawing on the previous module, in an interesting game between the drawer’s memory and the actuality of the resulting drawing on paper. The image of the drawing created by the mapping of all the points’ coordinates into the space of the window on the screen, is an exact copy of the drawing recorded on a text file, and printed from the screen earlier; and the drawer will see it for the first time, recognizing it as the drawing he produced, due to the memory of its making, and because he has the drawing on paper as a proof of this action. And this is a belief drawing, because the drawing on paper isn’t an exact copy of the digital one.

There are two apparently distinct moments in this system, the one concerning the making of the original or first (3) drawing(s) (input module, which works as a tracing machine with a manual input, that is, it needs someone drawing), and the one concerning its interpretation and (re)presentation (translations module). This distinction is only apparent due to the possibility, given to the observer, to unveil the drawer’s selections and marking process, because the output module is the presentation of a translation of the gestures’ sequence that produced the drawing. This sequence is presented as a duration event, one point after the other.

From the standpoint of the perception of a drawing as the corresponding image of something, this is an interesting approach, since the observer will interpret the visual information (interpreted data) as making sense (as a stable image), and will try to predict what is it that the drawing represents, in other words, he will create a new translation in the form

Fig. 8 – The drawing being revealed, pixel-by-pixel (or point-by-point).

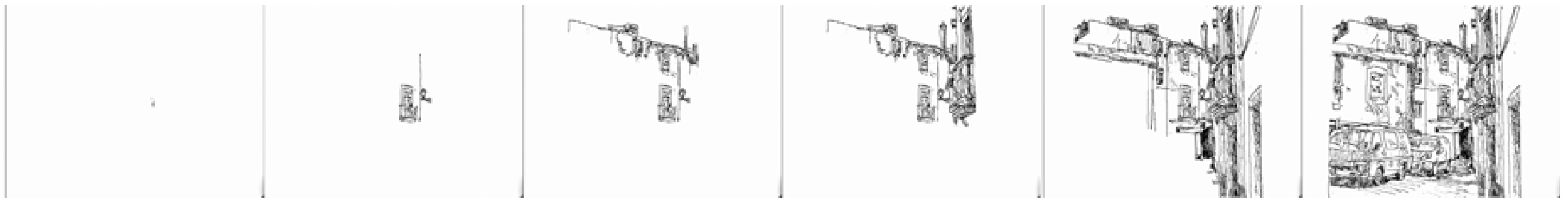


Fig. 9 – Original drawing 1 vs. original drawing 2.

of a shortcut to the drawing’s model.

“Most of what you perceive is not coming through your senses; it is generated by your internal memory model” (Hawkins 2004, 202). The shortcut occurs via the predictions and expectations produced by the memory of the observer and approaches the perceived drawing, being presented or constructed pixel-by-pixel by way of a projection, to the drawing made by tracing on a sheet of paper. This approach is perceived as the exact correspondence of one drawing with the other, since the image being presented to the observer is constituted by the data recorded during the manual input (the original drawing process). Actually, that doesn’t happen; in the analogic drawing process all the gestures made by the drawer are registered on the sheet of paper as a linear drawing, but in the digital process, due to the lag between the gesture’s speed and the tablet and computer processing capabilities, creates holes (sometimes unperceivable), or intervals on the data records corresponding to each position of each point during the drawing pro-

cess (similar to the lack of ink in a pen). This means that there is not an exact correspondence amongst these two drawings, and nonetheless they are perceived as copy drawings of each other, even if they are the original drawing produced by a tracing process.

Filling in these gaps is the observer’s creative job, in order to perceive the drawings as similar.

It is worth returning to Deanna Petherbridge on the translation or interpretation role attributed to the observer through drawing:

“The linear paths that the spectator/interpreter directly perceives or infers in the drawing constitute cognitive mapping. And such readings are inseparable from the affective responses to the gestural traces of the hand and the echo of the body, as well as the expressivity of the topic or subject matter of the drawing - or its absence. The difference between these readings constitutes the surplus of the drawing within which meaning is constructed.” (Petherbridge 2010, 90)

*The translations module 2 – Real time vs. extended duration drawing*

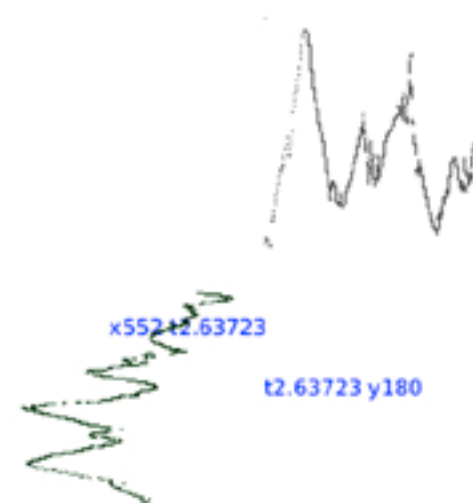
Data collected in the form of text files can be converted into very different kinds of information, depending on the machine created to interpret or translate it. In the present case, the data collected from the initial drawing process can be used, as seen before, to recreate the original drawing; or to make visible the duration of the drawing act, or the time intervals occurring during its making (corresponding to the decisions or hesitations of the drawer), or to make readable each position of the points in the line drawing, as well as the time intervals between each of the points. Looking at the intervals is, basically, a theoretical and speculative exercise that can be useful in trying to perceive the workings of the drawer’s mind. I call it speculative because one can infer, from the visual information produced as graphs moving accordingly with the interpretation of the text files, about the importance of duration for the making of a drawing, but it is impossible to make precise or scientific observations out of this information – partially because the computer internal clock varies the speed of the tempo (depending on its processing power), and partially because that information is presented as a drawing of a drawing, with all the transformations that such translation carries within itself.

“The line is a trace left by a moving point. Its essence is that it has directional value in relation to the co-ordinates of the field.” (Rawson 1969, 84)

For the present project, a moving point reflects an action inscribed in a duration and in relation to a given drawing field and subject. The duration can be manipulated, depending on the elasticity of the inter-

pretation of the data produced by the drawing information. For the Translations 4a/b.2013 project there can be two different kinds of duration: real time (or, as seen above, an approximation to it) or extended time by extending it to the duration of a solar day (since the first drawing was produced in an enlightening process, it can be translated into a daylight revelation, as a reproduction process of its making).

Fig. 10 – One kind of graph: x position/time and y position/time.



The graphs produced from the interpretation of the text files can appear differently according to the kind of information to be displayed; it can show the real time intervals between each point as a sequence constructing a line, or it can show the displacement of the pen tip on the drawing space during the making of the drawing (both of these outputs can be displayed as background drawings for the input module). The same data originates two different kinds of drawing that will be perceived by the drawer, or by an observer, as what they signify: the drawer’s decisions

and hesitations or the filling of the drawing field during a certain time interval.

In this meaning construction process, or application of the rules of visual processing, made through the revelation of the drawing marks during its extended presentation, there is another interval that needs to be filled by the observer. It is the time interval between each of his observations, perceived as continuity. If the drawing presentation has an extremely long duration (one solar day), it will be expectable that the observer makes some intervals, in order to avoid becoming annoyed, or because he has something else to do, or to avoid the adaptation of the visual system to the point in which the drawing ceases to be seen.

About this translation it is worth reviving the metaphor of the saccadic eye movements, and the production of continuity between fixations; the time lapses corresponding to the observer’s absence are filled by the observation moments, so that it is possible that the observer doesn’t notice the breaks in the drawing continuity, nor in the pair prediction-expectation, that is built along this relationship with the work.

The recurrence to the analogy with the saccadic eye movements has a double purpose: one, is to turn evident the continuity between the input and output modules; the other is due to the pair drawing and seeing in the present context.

“(…) vision is not uniform across the scene. Instead, the very centre of our vision is the only place that can see in great detail, and hence if we want to find out about the detail of something, we need to point the fovea at it. This requires an eye movement. (...) Such an eye movement is called a saccade...” (Snowden et al 2006, 331)

As stated previously, an observer relies in memory to fill in the gaps happening during the visual processing of any scene, and this process is so discrete that happens without being noticed. These movements of the eyes, happening voluntarily or not, depend on the attention placed on the subject. During the act of drawing these movements are voluntary and attentive: the eyes move according to chosen targets, and each movement of the eyes follow a certain pattern related to the disposition of the visual clue – the movement of the eyes is similar to the movement of the pen, since the hand moves the pen towards a target, determined by the look, in a motion that fills in the space left by this motion. This filling in of the space produces the line and has a duration, like the fixations between saccades. Each fixation corresponds to a visual saliency in the scene and can be related to the marks selected to the drawing. The linear drawing produces a continuity that is perceived as a whole; in the same way the visual processing of a scene is based on the creation

of continuities driven by the need of stability. The continuity process can create another kind of interval in the perception of the drawing (of its making as well of its observation): it can suspend or alter the subjective perception of time.

The second kind of graph mentioned above is a reflection on the subject of the continuity of vision and gesture during the act of drawing, since it presents a flow of durations filling in the field of drawing. It is the moving drawing of a moving curtain that distracts and informs simultaneously.

Fig. 11 – The curtain kind of graph: x and y in time.



*Last notes on modes of engagement*

As a practitioner I am constantly building my drawings from the previous ones, without a memory of its beginning and with an evolving diffuse goal, as if constructing a continuous and infinite drawing, or a never ending pentimento:

“O pentimento é de facto, um sinal impertinente, no sentido em que destrói uma suposta pertinência e linearidade do desenho como instrumento projectual. O pentimento é um sinal de que algo não ‘correu conforme o planeado’ e assim é um sinal de crise no sentido em que é a infiltração do imprevisto, do imprevisível. O pentimento é a mancha (a nódoa) que perturba a linearidade do ‘plano’.” (Bismarck 2006, 49)

[“The pentimento is indeed an impertinent sign, in that it destroys the supposed pertinence and linearity of drawing as projective tool. The

pentimento is a sign that something didn’t ‘go as planned’ and so is a sign of a crisis in the sense that it is the infiltration of the unexpected, the unpredictable. The pentimento is the blotch (the stain) that disrupts the linearity of the ‘plan’.” (my translation)]

This implies the availability to change, built on the connections between experimenting, reflecting and projecting, with the drawing assuming the form of a knowledge container of the drawer’s mind.

From my drawing experience, I can point two main reasons for the necessity of an evolving attention to drawing making: it is a way to detect and work with the modulation in repetition, and it is a form of approaching to my students – I must connect their attitudes towards

drawing acts to the drawings they produce, and I must communicate these connections. Modulation means constructing with modules in an elastic system, with its rules and gaps. Each module is a part of the whole, without a pre-established hierarchical position, and without any defined boundaries. Each module can participate in several sub-systems, alternating amongst them, without altering the system that is my drawing practice. It is important to be aware of repetition, because any gesture can produce a different meaning. Engaging with practice means allowing development, the consciousness that it isn’t possible to control everything and knowing that this porosity in control creates new spaces – imagining drawing as an immense and ever growing surface, in which every part has the ability to relate to any other without

corrupting the surface as a whole.

The modules are independent, repeatable, persistent and integrated.

In this never ending pentimento that I consider my drawing practice, all the marks that I produce with whatever materials I use, result from an act of drawing that can be decomposed and reshaped without ever losing its character -, and this is the harder part of the drawing’s work: not to get lost in the myriads of infinite experimentation. The attention to drawing as a research method can, then, be described as follows: understanding the drawing practice as a developing modular system, in which every module can be independent from any order or hierarchy, and repeatable, as long as the parts don’t lose their integrity becoming a kind of undifferentiated parts. If there is no integrity and persistency, the drawing practice isn’t possible.

This system has the advantage of allowing working with very disparate subject matters without losing its stability. Thinking about the translations between drawing practice and its research brought me into this approach to modularity as a developing and exchange tool, and has been a useful resource for my drawing thinking.

“Adaptability is an ancestral distinction of human intelligence, but today’s instant variations in rhythm call for something stronger: elasticity. The by-product of adaptability + acceleration, elasticity is the ability to negotiate change and innovation without letting them interfere excessively with one’s own rhythms and goals.” (Antonelli 2008, 14)

I think that by creating and developing this digital drawing machine, I am exploring a new way to approach drawing and seeing as a performative and integrated action, in the context of the realization of tracing as a research tool and authorial drawing practice. This augmentation of the drawer’s perceptive abilities (produced by the mediation of a computer) can be used to relate the material production of drawing (the gestures of its making) with the thinking of drawing as part of a larger process, embedded in the drawer’s mind.

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# Downs | Emergent Drawing: the drawing as a complex adaptive system

## Abstract

Drawing is strange.

We know it when we see it: even though drawings are by their nature distinct from one another.

We know drawing even when it breaks traditional boundaries and moves beyond drawing (e.g. Marshall and Sawdon's Hyperdrawing.).

But most perplexing the drawing in our head is distinct from the drawing on the page, which challenges us and in challenging us forces change on our draughtsmanship in completing the drawing.

The paper proposes a model that addresses the strangeness in drawing.

## Biography

Simon Downs studied illustration (of a particularly traditional school). The evolution of the computer aided design sphere forced him to rethink this traditional practice. In turn he became a digital illustrator, digital animator, interaction and multimedia designer and editorial designer. He worked in London, designing for the finance and publishing sectors.

In the year 2000 he became a university lecturer, which caused another round of reflection, a process which continued in 2003 when he joined Loughborough University as a lecturer and design researcher.

Simon has been an editor with the journal *TRACEY* since 2003, founded the the political visual culture journal *The Poster* with Intellect Books

in 2009 (as Lead Editor), wrote the book *The Graphic Communication Handbook* in 2011 for Routledge (in which year he also won the Loughborough University Lecturer of the Year award). He writes on visual communication systems (including drawing), is a Director of the *Drawing Research Network* and is a trades union representative for the *UCU* union.

'It is in the visualisation of ideas, and the expression or representation of our ideas, that we can bring something more clearly into consciousness. A drawing might be seen as an externalisation of a concept or idea.' (Brooks, 2009: 319)

'Most such sketches should be classified as 'drawings' which are representations of either direct percepts, or ideas and images held in the mind.' (Goldschmidt, 1991: 1)

## Introduction

In the quotes above Brooks and Goldschmidt express a commonly held and, as far as I know, wholly reasonable model of the operation of drawing. However this kind of internalistic model of drawing, as a direct transcription of thought,<sup>1</sup> fails to address some key questions around the construction of the drawing and its ability to communicate.

The question to ask ourselves is: are we satisfied in visualizing the process of drawing as a 'black box' operation with the artist's brain at one end and a completed drawing at the other, but without any knowledge of the processes that lay in between? We should be asking about the processes, internal to the artist and external in the world, that compose to allow a drawing to operate in a way that can effect both the artist and the viewer. (Fig. 1)

But more than this, if the drawing is nothing more than a trace of an operation between artist and material, how can the author of the work possibly be surprised by the effects produced by it? A scenario that is familiar to most draughtspeople.

All of these questions are elements that, far from being problematic hurdles to overcome, represent clues that point to drawing (the activity) being a form of phenomena called a Complex Adaptive System that creates drawing (the artefact).

<sup>1</sup> A model of drawing that depends on internal resources for its operation.

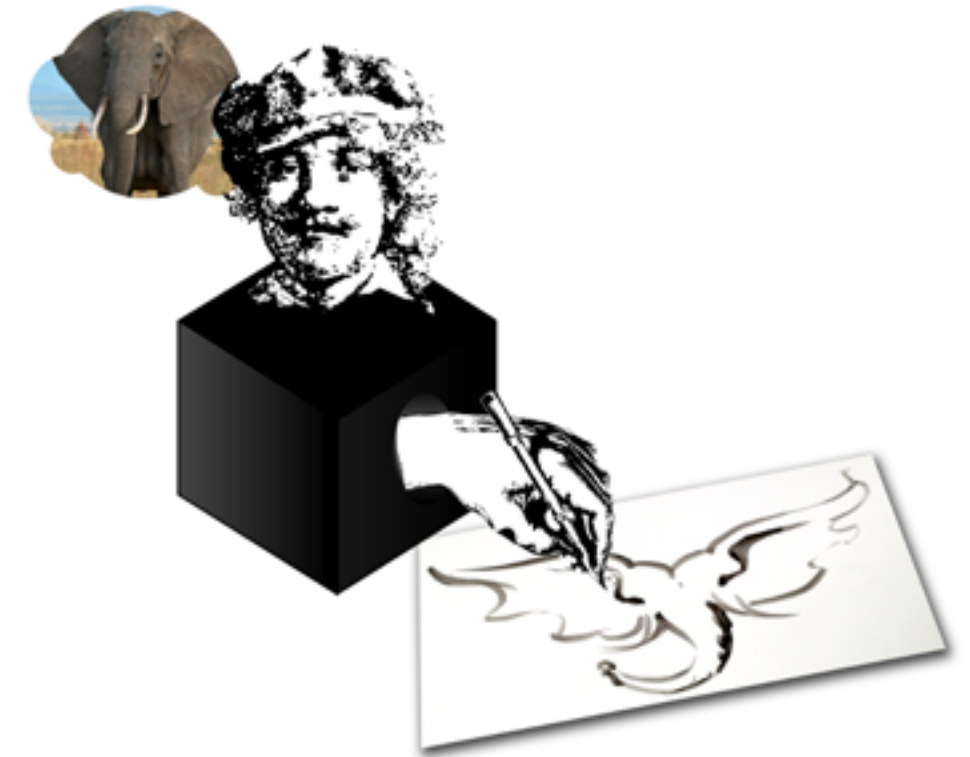


Fig. 1 – A black box model for drawing

## Drawing – A Commonplace Miracle

If we are stopped on a street by a lost stranger asking for direction we may, on consideration, make the judgement that beyond a certain number of steps a set of verbal directions will cause more problems than they solve.<sup>2</sup> In such circumstances a map is just the thing.

So, reaching in our pocket we pull out a scrap of paper and a pencil, and knock out an impromptu schematic of the locality. Which, in turn, allows the stranger to reach their destination speedily and without fuss. Please stop for a moment and marvel, because this sketched map represents a commonplace miracle.

Think about it. Our map has taken a head full of dense local knowledge and refined it to leave a set of visual representations. Representations that visibly represent an intentional subset of our knowledge: knowledge of the world mapped onto an internal model of a stranger's mind. Knowledge made fit, just for them.

<sup>2</sup> If you doubt the assertion look at the Pleripus: a text based guide for a long journeys that served the Classical world in place of maps. See Periplus Maris Erythrae ('Voyage around the Erythraean Sea') at <http://depts.washington.edu/silkroad/texts/periplus/periplus.html>.

By way of an example in the figure the author was attempting to explain the structure of a Net (the flat plan of a folded 3D artefact, like a box) to an overseas student, with limited English language skills. The drawing acted as quick, common, reference point for final object (a combined book and display box).

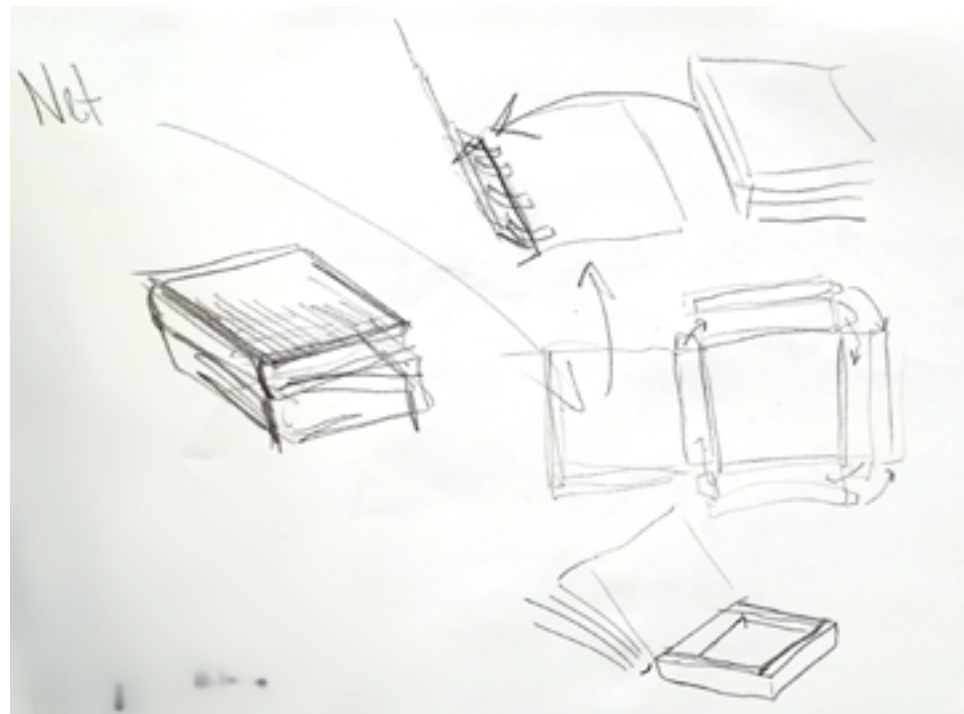


Fig. 2 – A thumbnail rough explaining a mixed book and package

Many individual elements of the conundrum are canonical: as the draughtsperson of the map we draw and evaluate the drawing for scale, fitness and completeness: A cycle of drawing, enabling strategising and evaluation as we work (Goldschmidt, Suwa and Tversky), Dennett's Intentional Stance offers a viable way of describing the way in which we fixed on an apposite symbol set for this notional stranger to understand the proposed route, Norman and Baynes give us a model that describes the process of articulating a drawing to enable design. There is a mass of research describing the discrete parts: the cognitive, craft, cultural and historic functions of drawing.

What is less obvious is a description that connects these varied, but canonical, descriptions in a way that acknowledges the existing models but casts them within a broader framework. Seeing each part as valid and functional while being contributory to the whole. Such a framework is provided by Complexity Theory (In the case of drawing a thing called

a Complex Adaptive System.), with the drawing being the Emergent product.

Complexity allows for a model of drawing that acknowledges a variety of contributions being made to an individual drawing, on a case by case basis, producing results that can be original and distinct; that speak to the past and demonstrate novelty, while still existing in a framework with cultural relevance.

#### **What is Complexity?**

The world is full of complicated things: most of which don't demonstrate the sort of behaviours that can be characterised as Complexity. We are familiar with agglomerations of elements and events that incorporate a large numbers of functional elements; for example a car; but which in their multitude of parts compose to make systems that are broadly predictable in action. Despite differences in individual elements; for example diesel or petrol, manual or automatic; most drivers can drive most cars (most of the time). This is an example of a Complicated System: which is to say a system where the function of the individual parts in the system are known, as is their contribution to the function of the whole. This may be expressed by the idea of things being the sum of their totality of their parts.

However such certainty has faded away as the tools with which we look at the world have increased in power and analytical subtlety. Systems have been discovered that contain elements whose individual behaviour is well known, but which show unpredictability (Chaos) and novelty (Emergence) in operation, when combined with other elements in their system.

The philosopher Paul Cilliers (Cilliers, 1998) uses the metaphor of a Jumbo jet to help understand a complex system.

‘If a system –despite the fact that it may consist of a huge number of components–can be given a complete description in terms of its individual constituents, such a system is merely complicated.’ (ibid)

But the evidence shows that an understanding complicated systems only takes us so far.

Research shows that when agglomerations of elements incorporate large numbers of parts, that are individually well understood (for example houses and roads and people in a town or a city); which are interacting together with other elements (geography, culture, etc.) that are also well understood, with interaction on and across a number of levels;

unexpected behaviours are produced, a distinctive cultural district here or a persistent travel black-spot there.

The kinds of systems that produce this sort of unexpected behaviour are labelled, not as ‘complicated’, but as systems showing ‘Complexity’. Chan (2001: 1) gives a usefully brief description: ‘Complexity results from the inter-relationship, inter-action and inter-connectivity of elements within a system and between a system and its environment.’

So returning to my notional car and Cillier's ‘Jumbo Jet’, we find that the complex but predictable, system breaks down as soon as it engages with the larger world. For when Cillier's plane flies and my car roles it becomes part of a larger system of contributory elements (weather, geography, user action, etc.) which, in combination with the known (the car and plane), produce unexpected behaviours: they start to show Complexity.

‘In a complex system, on the other hand, the interaction among the constituents of the system, and the interaction between the system and its environment, are of such a nature that the system as a whole cannot be fully understood by simply analysing its components.’ (ibid)

Returning to the idea of a town and its development from a mass of well understood functions into a distinct community, we observe that beyond certain sizes distinct characteristics emerge. Cities start to generate and mutate cultures, they acquire specific geometry (as a result of mass transit systems interacting with culture, terrain and resources), they take on lives of their own beyond the intentions of urban planners. This life is attributable not to the elements themselves, but to the ways in which these elements interact with each other. The mass of decisions, played out against the fabric of the town, start to move the town into forms that are inherently unpredictable.

This way of thinking stands in stark contrast to earlier models of thought where (if reductio ad absurdum arguments are applied) larger groups were just compounded of smaller things; we might find that understanding the atom allowed you to understand proteins, understanding proteins allows you to understand cells, which in turn allows an understanding of brains, which affords us viable insights into thought, and so on up to the point where the Mona Lisa can be determined as the natural outcome of the Big Bang.

So when, in 1927, Bertrand Russell stated in *The Analysis of Matter* that, ‘...the characteristic merit of analysis as practised in science: (is that) the properties of the complex can be inferred from those of the

parts.’ (Russell, 1992: 22) A proposition that in the new world of atomic physics must have seemed plausible, completely fails to recognise the sheer number of ways that ‘the parts’ in the world can interact with one another to surprise us.

In operation complexity research tells us that complexity is not just a matter of the number of elements in a system, it is a matter of the elements being capable of interaction between one another and other agents.

100 marbles (marbles being chosen for their proverbial lack of connectivity) are no more capable of effect, connection or organisation than are a 100000 marbles; by contrast a 100000 pieces of Lego are considerably more capable of interaction than are 100 pieces. The number of possible interactions in 100000 pieces of Lego is of a completely different scale than 100. This characteristic of a system of elements being capable of a greater range of interaction than the simple sum of its parts is called a non-linear relationship.

When you add the capacity of the system to store and recall of these past interactions (as a pattern of Lego blocks does) to seed the next cycle of development you find you have moved beyond mere numerical ranges of possible interactions and into the realm of patterning and evolution.<sup>3</sup>

Non-linear systems have some interesting characteristics, characteristics that have excited mathematicians, engaged physicists and divided economists. For a start the ‘unexpected behaviour’, a function of its non-linearity is, by definition unexpected; but more than this it is unpredictable, and productive of unintended consequence. Add the quality of a system memory (past patterns), and we start to see evolution. Looking back to our Lego example we could see that a child with our mountain of marbles could only engage with a very limited range of games whereas a similar sized stack of Lego could keep a child busy for years without repetition.

Complex systems are by their nature unpredictable.\* Such systems are however amenable to ‘retrodictive’ analysis (Krippendorf, 1968: 115), allowing the possibility of post facto analysis of the contribution of the parts to the end state.

<sup>3</sup> This is what systems scientists call ‘Dependency on Initial Conditions’. Alexander notes: ‘The complex process involves the concept of memory and determines its next state based on the immediately preceding state.’ (Alexander, 2011: 175). In this way the next drawing is likely to be the child of the previous drawing: but like a real child family resemblance only goes so far in predicting what comes next.

We can look at the choice of mark made by Goya and divine all sorts of information that informs us about his technical processes, cultural position, age and state of health at the time the work was made. A state of affairs that might be seen as a step forward to understanding, and potentially predicting, any reoccurrence of the complexity being examined (in this case the work of Goya).

Unfortunately, as any draftsman knows, a set of steps that told you how a previous drawing was made will do very little to help you predict the way the next drawing comes out: we might imitate Goya, but it won’t be Goya. There is no algorithm for making a Goya.

As a thought experiment we might speculate that using a time machine to bring Goya into the 21st Century might produce a very different cannon of work through interaction with modern materials and a different cultural framework. A change in the elements (including Goya) that make up the work will change the work.

Cilliers also makes a useful distinction between apparent simplicity and hidden complexity:

‘The distinction between complex and simple often becomes a function of our ‘distance’ from the system (Serra and Zanarini 1990:4, 5), i.e. of the kind of description of the system we are using. A little aquarium can be quite simple as a decoration (seen from afar), but as a system it can be quite complex (seen from close by).’ (Cilliers, 1998: 2)

In this way, while the elements of a drawing (a draftsman, media and surface) are apparently simple, the actuality of the system is itself very complex indeed.

#### **Complex and Adaptive**

Some systems showing complexity are also complex adaptive systems. The distinction being that complex adaptive systems are dynamic and responsive (the ‘adaptive’ element in the name). These represent systems where the elements in the compose to make something that doesn’t run to either a ‘Locked System’ or ‘Broken System’. A Locked System is one where the elements and processes lead to one, and only one final stagnant state with no possibility of evolution. A ‘Broken System’ is one where a system runs to disorder and structure is impossible. In a complex adaptive system dynamic growth is possible (indeed it is a primary characteristic). Chan describes Complex Adaptive Systems (CAS) in the following way:

‘CAS are dynamic systems able to adapt in and evolve with a changing

environment. It is important to realize that there is no separation between a system and its environment in the idea that a system always adapts to a changing environment. Rather, the concept to be examined is that of a system closely linked with all other related systems making up an ecosystem. Within such a context, change needs to be seen in terms of co-evolution with all other related systems, rather than as adaptation to a separate and distinct environment.’ (Chan, 2001: 2)

This co-evolution between system and environment is one of the characteristics that makes complexity a compelling model for drawing. Gell-Mann characterises CASs as:

‘1. Its experience can be thought of as a set of data, usually input ~ output data, with the inputs often including system behaviour and the outputs often including effects on the system.

2. The system identifies perceived regularities of certain kinds in the experience, even though sometimes regularities of those kinds are overlooked or random features misidentified as regularities. The remaining information is treated as random, and much of it often is.

3. Experience is not merely recorded in a lookup table; instead, the perceived regularities are compressed into a schema. Mutation processes of various sorts give rise to rival schemata. Each schema provides, in its own way, some combination of description, prediction, and (where behavior is concerned) prescriptions for action. Those may be provided even in cases that have not been encountered before, and then not only by interpolation and extrapolation, but often by much more sophisticated extensions of experience.

4. *The results obtained by a schema in the real world then feed back to affect its standing with respect to the other schemata with which it is in competition.*’ (Gell-Mann, 1994: 17) Author’s emphasis.

#### **Drawing Emerges**

Research indicates that order can often spontaneously emerge from CASs, and that this order will be characterised by qualities that are novel, stable and downwardly causal (they effect the system that supports and instigated the complex system in the first place, driving it to new an unexpected places). This phenomena is called *Emergence*.

Emergence has been mathematically implicated in stock market fluctuations, intelligence, ecosystems, weather patterns, the chemical composition of proteins and social and cultural systems. In recent



years Emergence has been researched in; biological systems (Kaufman, Corning, Holland), economics (Whitt, Schultze), physics (Laughlin), Mathematics (Wolfram), Linguistics (Keller) and visual culture (Wheeler, Alexander, Downs). And while Emergence is difficult (some experts say intrinsically impossible) to predict it's effects are very real. Goldstein observed characteristics of Emergent systems are:

'To Goldstein, emergence refers to "the arising of novel and coherent structures, patterns and properties during the process of self-organization in complex systems." The common characteristics are: (1) radical novelty (features not previously observed in the system); (2) coherence or correlation (meaning integrated wholes that maintain themselves over some period of time); (3) A global or macro "level" (i.e., there is some property of "wholeness"); (4) it is the product of a dynamical process (it evolves); and (5) it is "ostensive" — it can be perceived. For good measure, Goldstein throws in supervenience — downward causation.' (Goldstein, 1999: 49-72)

It's not hard to see that all of these characteristics appear in drawing (as both verb and artefact).

*Radical Novelty:* Drawing shows both material and cultural novelty. The material elements of the system involved in the drawing (draughtsperson, drawing tool, surface, etc.) and the cultural frame the supports the system show radical novelty after the drawing has happen when compared to the contributory elements before the drawing occurred.<sup>4</sup>

*Coherence:* The drawing clearly exists as a distinct 'integrated whole' that supports itself over time. While each mark contributes to the whole, when taken out of context they lack a proportionate effect to the power they contribute to the integrate whole. It is possibly to conceive of a level where the lines are sparse enough to not demonstrate the complexity called drawing: where the drawing hasn't yet cohered. (Fig. 3, left)

*Global or Macro level:* Drawings are readily identifiable as wholes; things unto themselves. This quality of 'thingness' might, possibly, be seen as just an artefact of cultural framing. The framing might, quite literally be a frame or some other sort of cultural device that says this is a 'drawing'.

We might think about the work 'Taking a line for a walk' by Maryclare Foa where the work exists as part of the geography of Manhattan (arguably without specific framing). But this work is being framed by both

the cultural context (as a performance piece) and by the photographs that record the work (as seen through a Vetruvian Window).

This cultural frame is still a frame, the cultural dimension always has a role (as discussed below) in crystallising the system that becomes a drawing. With the frame in place we know when we're involved as viewers in the construction of the whole that is the viewed. (Fig. 4)

*Dynamic Process:* A drawing is nothing if it's not a dynamic pro-



Fig. 3 – Brian Fay's Corot Woman Meditating. *Playing with idea of a drawing before it coheres.*

Fig. 4 – Maryclare Foa's Taking a Line For a Walk. *A drawing where the frame is cultural.*



cess formed through interplay between different parts of the system; draughtsperson / viewer, material / knowledge, artefact / action. From the developmental drawings of a designer to the gunpowder work of Cai Guo-Qiang drawings are defined by being records of a series of changes of state: an evolution from one state to another.

*Ostensive:* One of the primary functions of drawings is there ability to be perceived. That a drawing can be seen is obvious, that a drawing can be seen as having an existence 'apart' from the draughtsperson, yet of them: outside and different from the internal scheme that was it's blueprint, its point of origin.

*Downward Causation:* As a designer this is a function for drawing as emergence that is both most apparent and most useful. Drawings make change in the systems that supported their emergence. A drawing can instigate the process of materialisation (from a website to a skyscraper). But even drawings never intended to act as a 'paper model' (after Norman and Baynes) of the world make change in the author (for sure) and in potential for making future drawings. Having made a drawing the author cannot unmake the knowledge of the drawing in making future work: the drawing they made has a causal effect on them.

<sup>4</sup> In her book 'The Biologist's Mistress', Victoria Alexander thinks it worth footnoting that Goldstein insists that '...emergence must involve negation to allow radical novelty, not merely ordinary change.' (Alexander, 2011:85)

**Charting Emergent Drawing**

There are many potential ways of visualising intangible events like drawing in a diagrammatic form, this is one of the great achievements of visualisation as a practice. In this case a simple Vehn diagram might usefully capture a snapshot of the claim that drawing is emergent. But in this very quality of the snapshot it fails to engage with the inherently dynamic, fugative and, downright precarious nature of the complex systems from which drawing emerges. Drawing truly rests on the razor's edge of emergence.<sup>5</sup>

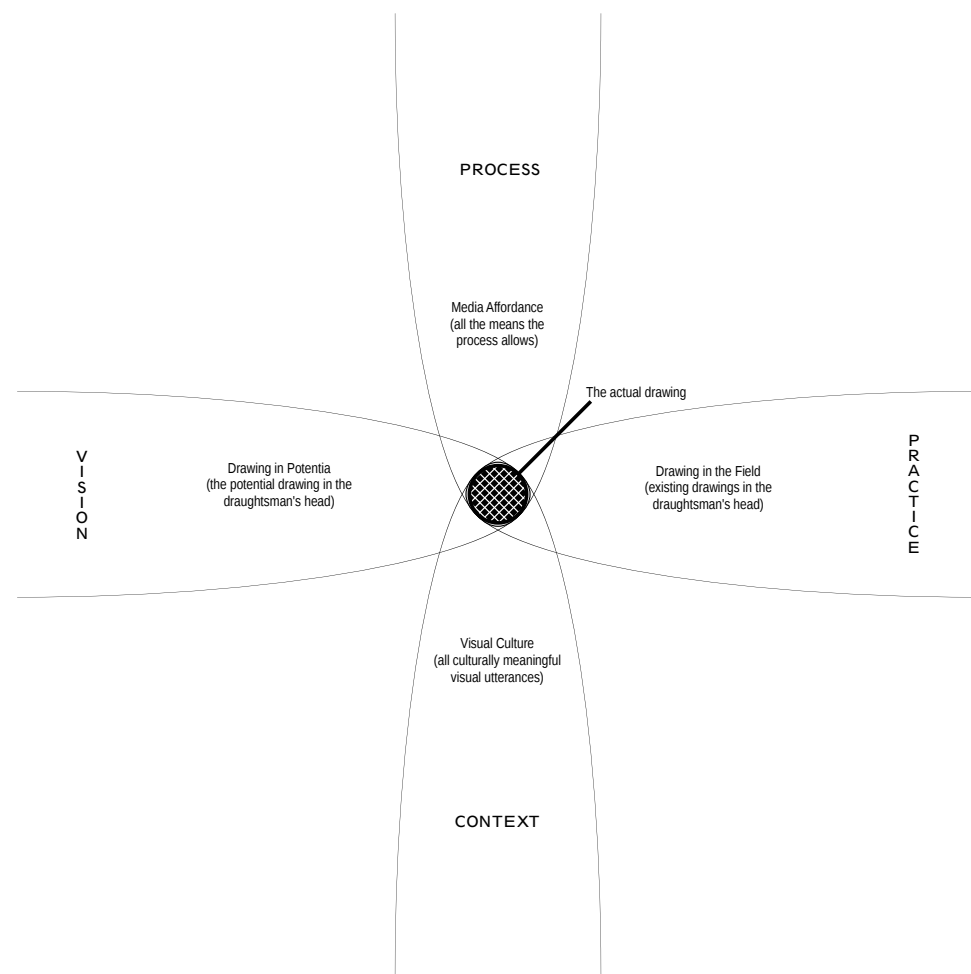


Fig. 4 – Emergent Drawing - As a modified Vehn diagram.

<sup>5</sup> The 'razor's edge' is a term for the 'edge of Chaos' (Waldrop), describing the state which is dynamic enough to be evolving and yet stable enough not to be chaotic. Waldrop (1992:12) says: 'The edge of chaos is the constantly shifting battle zone between stagnation and anarchy, the one place where a complex system can be spontaneous, adaptive, and alive.'

In this spirit, and as an aid to understanding, I would ask you to consider the Cat's Cradle as a more suitable visualisation of drawing as emergent. An ancient game, the Cat's Cradle, is one where one or more participants dynamically form patterns of string by reflexively adjusting a simple set of governing parameters (fingers and the finger's position relative to one another).

Despite the small number of variables at play (number of fingers, number of hands and their position) the resultant patterns show evolution, intricacy and variation. Each product is identifiable as distinct from the next, each pattern jumps into existence where there was previously nothing but string.

If we visualise the drawing as the pattern made with the string, and the individual hands in play may be thought of as:

- the Drawing in Potentia
- the Media Affordances
- the Drawing Precedent, and
- Visual Culture

Then we can see that any flexing of any of the fingers involved simultaneously changes the pattern (the drawing) and the position of the other fingers (in this case the conditions contributing to the drawing's creation). And this is exactly what we see in the world. Work is made, the nature of the work is dependent on its constituting elements and conditions the work is constructed from.<sup>6</sup> And once made, the work

<sup>6</sup> Technically known as 'dependencies' or 'systems dependencies'.

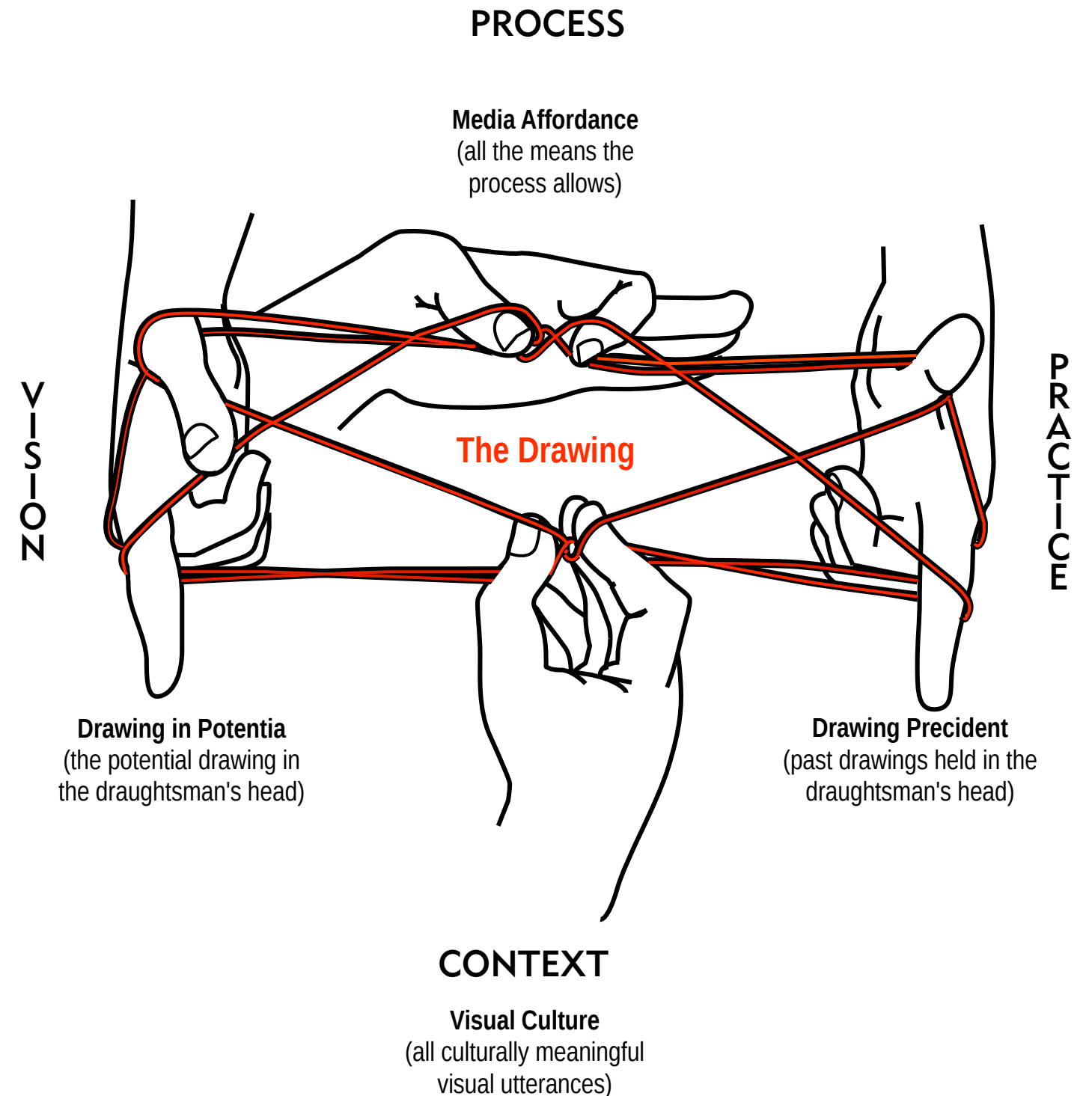


Fig. 5 – Emergent Drawing - As a Cat's Cradle

changes the draughtsperson, the dependancies and the work that follows it.

#### *The Four Elements*

*The Drawing in Potentia* is the idea of the completed work in the draftsman's mind as they work. The conceptual intention without a current physical manifestation. This may be as vague as a notion for a work, a structural as a formal process of ideation (e.g. a designer's rough) or as tightly devised as an extensive program of future media manipulation (e.g. a fine artists practice), but until the work is materialised it exists entirely in potentia. It is worth noting that the work that comes into existence (in esse) is rarely the same as it was in potentia. This quality of dynamic evolution through drawing, while still being recognisably of the same lineage at the end, is characteristic of emergence.

The drawing in potentia exists as a kind of imagined doppelgänger of the drawing in esse. The draughtsperson will be considering the qualities of the other three elements as they make decisions over the actions they take, and in their internal modelling of future actions. Suwa and Tversky note this process in action: 'sketches serve as a "perceptual interface" through which one can discover non-visual functional relations underlying the visual features.' (Suwa and Tversky, 1997: 401)

The 'affordance' in *Media Affordance* is a term borrowed; originally from Psychology and laterally from Human Computer Interaction (HCI); commonly though not originally, through the work of researcher Donald Norman and his work on the ways in which humans engage with the physical world around them. In turn Norman borrowed the concept from an earlier psychologist J.J. Gibson who defined the concept of an affordance around the human ability to see a range of possibilities latent in the environment. When faced with a door knob we will clearly see its affordance as means for opening the door, while also seeing its use as an impromptu coat hook, or bag rack.

In this way, to a draftsman, a specified combination of media and tool will have a specific affordance. A range of operations that might viably be enacted with this tool. This is entirely different from tradition. While tradition informs the draftsman about possible existing applications, artists and designers are by their nature curious and experimental. In this way we see someone, like the fine artist Jordan Mackenzie, do something unexpected with a media (e.g. Jordan, a boiler suit, graphite and a large box). Thus we see our concept of the range of possibilities inherent in the media, its affordance, expand (the range of graphite powder becomes larger). Once again we see the ways in which draw-



Fig. 6 – Jordan Mckenzie - Untitled: At Arms Length

ing demonstrates emergent qualities: being at one and the same time recognisably a drawing and yet redefining our notion of what drawing is (novel, coherent, existing on a global level, dynamically evolving, ostensive and downwardly causal).

*Drawing Precedent* is the personal historic process knowledge actively informing the draftsman while they work: both embodied Kinesthetic learning and codified practice knowledge. This is a different class of knowledge than the sort of declarative knowledge that typifies theoretical studies of drawing. The Drawing Precedent is justified through a personal (often physical) experience (a Doxastic Justification rather than Propositional Justification). This form of knowledge is often tacit, formed by internally generated heuristics, and explicitly held in mind as Practice while working: as noted by Suwa, Tversky (as 'segments' and 'dependancies') and Goldschmidt (as 'design moves'):

'Goldschmidt conjectured that sketches give access to various mental images. figural or conceptual, that may potentially trigger ideas in the current design problem.' (Suwa and Tversky, 1997: 386)

The working draftsman often reviews their ongoing work against the precedent established by their successful practice in the past.

'Facilitation by external representation derives, not just from its external existence, but from the interaction between the representation and the cognitive processes of interpreting it.'

This phenomena is closely linked to what Suwa and Tversky called, in Architectural drawing, 'background knowledge'.

'Background knowledge in the domain of architectural design includes (a) domain knowledge about structures and materials for fulfilling certain functions, and spatial arrangements; (b) standards for doing the aesthetic and preferential evaluations for their own design decisions; and (c) knowledge about the relevance and influence of the architectural designs to/from the social contexts, and the environments in which the architecture is built.' (Suwa and Tversky, 1997: 389).

The Drawing Precedent is distinct from the Visual Culture in that while the Visual Culture will, at some time, have informed and directed the draftsman's practice this information will be seen as belonging to an external field of reference and connotation, whereas the Drawing Precedent is something held as personal because it exists as a recalled memory of physical action. In this way it feel personal and authentic.

*Visual Culture* is, by contrast, the environment in which the work grows. Not necessarily as connected part of a system of signification and dependent on that system for its ability to act (as the work I used to make as an illustrator and designer was), but even as non-figurative, conceptual or abstracted work which is defined in contention or opposition to the system of signification. As the biologist and systems theorist Humberto Manturana would note, any element that contributes to or is acted on by a system is a part of the system. In systems terms a drawing is part of the greater visual cultural system when it acts on or is acted on by the visual cultural system. It is a debate beyond the terms of this paper as to whether a drawing can be seen as a drawing at all if it exists completely outside the visual cultural realm.

Also embedded within the Visual Cultural is the observer (and the observer has a role to play in the drawing). Within this context even the draftsman's Drawing Precedent becomes recast as an element in the visual cultural system, informing the current work's relation both towards the history of the field and towards the previous work of the draftsman.

This Visual Cultural element and that of Drawing President both address the notion of originality. While not suggesting that complete originality; beyond reference to any existing work, previous material

use and practice, or the viewers physical facilities; is impossible, it is worth considering how rare it is. Witness the lengths that people have to go to even achieve something like originality. Common approaches to drawing originality involve an intentional modification of one or more of the parameters suggested above (which tends to suggest there is validity in the thesis). We see draughtsmen altering material choices or their physical relationship to the media: altering the Drawing Affordances, we see draughtsmen training themselves in different processes (accessing new Drawing Precedent), and we see draughtsmen embracing new visual cultural sources to inspire changes in direction (Visual Culture). While all of these three will be creating a feedback loop inputting to (and receiving input from) the Drawing in potentia.

In this analogy, as soon as this idea is manifest (drawn), the fingers of the Drawing in Potentia hand flex and in flexing change the pattern. The new drawing changes the possibilities inherent in the Media Affordances; the draftsman knows their ability to work more fully; and the environment has been changed through the addition of this new work. The pattern (drawing) made in this instance changes the elements that have made it in the first place, and while the fingers may attempt to form the same pattern again they never can; because the pattern has changed them.

### Conclusion

The model proposed in this paper suggests a way of looking at drawing (and other creative activities) that intentionally supports (rather than denying) existing drawing practice: while framing it as something more than a personal endeavour disconnected from the world it inhabits. Drawing, if it is to be understood, needs to be seen as something that happens simultaneously inside the heads of all the participants of the drawing and in the world between them. Its power to operate being the emergent effect of the interaction of something more than the interaction of the elements contributing to the work.

This, in turn, suggests that personal practice can usefully be extended, refined and revitalised by making changes to those things in the world between draughtsperson and audience that are available to change. The cultural framework the drawing operates in, a change of media and novel sources of inspiration are all well understood as ways of enriching existing practice. While acknowledging this, the paper points out that nature of the underlying processes means that while we cannot predict the form the change will take, the work produced will, like our children, still carry our stamp; and like a child, will be something completely new, wonderful and beyond us.

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# Graham | Point, Mark, Line, Outline: Thinking Through the Drawn Line

## Abstract

The purpose of the paper is to report on the findings from a recent drawing research residency undertaken at the Centre for Recent Drawing, London, UK in 2013. In doing so, my aim is to articulate how the act of drawing can function as research, and how a particular method of drawing can show that to be the case. My enquiry is focused on a phenomenological analysis of the drawn line as it is encountered in subjective experience. My aim is to question the line's ability to be seen to record, or otherwise 'capture', the thinking that underpins it. The line as it is being drawn is therefore considered both in relation to its representational capacity and its capacity to act as a record of its own making. This second notion relates directly to the idea that the drawn line functions as an indexical link, recording something of the presence of the draughtsman who produces it. This notion forms an axiom within the discipline of drawing connoisseurship no less, dating back to Antiquity – “by his line shall an artist be known”. In my research, I have been treating this axiom as more of an assumption. By examining what might be supporting this assumption, I have begun to question what might lie beyond it. By this I mean the trajectory of my enquiry is now interested in what the drawn line might be understood to 'capture' if we allow the physical examination to point towards what a more metaphysical consideration of it might reveal.

## Biographical Details

Joe Graham is a current PhD candidate in Drawing Research at SOTA, Loughborough University (2011 - ). The focus of his practice based research is a phenomenological analysis of the drawn line. This investigation began by analysing the drawn line as a direct record of the thinking that underpins it. His developing research is now also focused on examining the assumption that this prior notion rests upon - the line as an indexical link, 'capturing' something of the presence of the

draughtsman himself.

In 2010 he graduated from the Slade School of Art, UCL with his MFA in Fine Art Media. In 2010 he was also the recipient of the Henry Tonks Drawing Prize from UCL. Recent projects include a 3-month drawing research residency at the Centre for Recent Drawing in London (2013) titled Thinking Through Outline, which also culminated in a solo show.

More information can be found on his website: [www.joegraham.eu](http://www.joegraham.eu)

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## Introduction

The purpose of this paper is to function as a report on progress concerning my current research into drawing. The nominal focus will be on discussing the immediate results of practical work produced during a drawing research residency I completed earlier this year at the Centre for Recent Drawing in London, UK. The research residency was three months long, and in that time I produced work with the aim of testing out a number of particular methods of drawing that form part of my current practice-based PhD in drawing research. The drawings are considered by me to be primary research material within my on-going enquiry. These are supported in their development by secondary research material in the form of both pre-existing and current discourse from the fields of drawing practice, philosophy and art history, which together combine to lay out the territory within which my enquiry operates.

However, by functioning as a report on progress this paper will also branch out into discussing the developments, both practical and theoretical, that my research has taken as a result of having produced these drawings. Overall, these developments have revealed perhaps the most important function of making these drawings – as a vital aid to clarifying my thinking concerning the direction my research is heading in. This paper will therefore put forward reasons for why the act of drawing is itself a form of research, and in what way I believe it can function to be so. Prior to discussing these developments I will briefly discuss the current focus of my research, and the background to the enquiry. In order to make sense of the way in which I am discussing this topic, I will also briefly outline the epistemology through which I am approaching my research, and the methodological tools I am using to conduct it, both of which are fundamentally phenomenological in scope. After a discussion of the outcome from my residency work, I will conclude the

paper with a more speculative and philosophical consideration of these findings when considered against certain art historical assumptions concerning drawing scholarship that date back to the Ancient Greeks. This is included as a way of broadening the scope of my enquiry within this paper, and to reveal a further function of my particular method of drawing as a form of research.

## Current research focus

### *The phenomenology of the drawn line*

The point at which my enquiry is currently at concerns an investigation into the phenomenology of the drawn line. The specific purpose of my research up until this point has been this; to inquire into the extent to which the drawn line can be said to 'capture', or otherwise record, the particular, unique and individual phenomenal flow of thought that went into its creation - understood from an experiential, rather than a cognitive perspective. This is the focus of my practice-based research enquiry. In analysing the results of the residency work, I will identify some of the developments that my enquiry has taken. This includes an analysis of certain assumptions concerning drawing as a uniquely authorial form of art practice. These assumptions have revealed themselves through the use of certain phenomenological tools used for analysis during my on-going research, with a focus on one method in particular. This method is known within the discipline as the phenomenological reduction (Moran, Cohen 2012, Husserl 1931/2012).

### *What is the 'drawn line'?*

For the sake of clarity before I begin I will briefly stipulate here how I am referring to the concept of the drawn line. The drawn line is, as I understand it, created by “a point that moves”. To paraphrase the art historian and writer Philip Rawson who coined the term (Rawson 1987) the point that moves makes a mark that records a two dimensional movement in space. Such a movement constitutes one of the more fundamental aspects of drawing: what can be termed its “kinetic basis” (Rawson 1987, 15) It does not matter what implement you draw with, or the surface upon which you draw – such a movement is employed for fixing, more or less strongly, the implicit movement of lines. This kinetic basis is, for me at least, one of the primary ways of understanding what drawing is fundamentally about.

### *The concept of the line*

Using these methodological tools, my enquiry is currently focused on

trying to analyse both the immediate and the underlying nature of the drawn line as it reveals itself to the practitioner within lived experience. Ultimately, this analysis has led me to consider what appears to be the inevitable philosophical dimension that underpins the enquiry as a whole. This concerns a consideration of the drawn line not just in relation to its physical manifestation as a line, but also a reflection on the some of the axiomatic assumptions that underpin the way in which the drawn line is held to operate as a kind of indexical link – a fundamentally ‘literal’ trace of the draughtsman who produces it (Rosand 2002). It is my belief that by considering this notion in more detail, we are encouraged to extend our examination into the very concept of the ‘line’ itself, as we encounter it in other areas of our experience beyond the merely physical. By this I refer not just the way in which we encounter the concept of the ‘line’ within our understanding of physical space, but also within our understanding of time. I am encouraged to do this because from a phenomenological perspective, which concerns the world as we experience it, we find we cannot sensibly separate time from space, and vice versa. We encounter them together. (Merleau-Ponty, Toadvine 2007).

The result of this development is my current belief that an inescapably metaphysical element emerges within the discussion of what autobiographical ‘element’ the drawn line is said to contain. This emerges when we consider this question in its relationship to the far larger problem of what is understood to exist in an ontological sense, especially when we are asked to consider how we persist through time (Callender 2011). I believe this line of questioning to be particularly pertinent if the practitioner is determined to be rigorous in following the rules of phenomenological analysis when applied to the problem. (Moran, Cohen 2012, Husserl 1931/2012).

#### **Background to Research**

##### *The hypothesis underpinning my research enquiry*

The hypothesis upon which I began my research was founded upon a number of assumptions. The main one concerns the implicit understanding I had formed as an artist, that the drawn line, considered as a physical act, does in some way operate in a dualistic fashion, by possessing both representational and indexical traits. By this I am referring to the generally held notion that a process of drawing can be considered as both a direct record of the thinking that underpins it, and as a literal ‘trace’ of the artist in that process. (Garner 2008). It was my guiding belief that the drawn line can in some way be seen

to ‘capture’ the specific authorial presence of the draughtsman who produces it, due to the implicit understanding that the hand, eye and mind are connected to the drawing implement in a relatively direct and unmediated fashion (Kingston 2003). I also was aware that it did so in a manner that appeared markedly different from other forms of visual communication, such as writing. These were implicitly held positions I began with – assumptions in other words, based on my prior experience as an artist who draws.

However, I did not know exactly how this operated in practice. How could I, the draughtsman, articulate myself as been ‘contained’ somehow within my own drawn line? How did the line embody, in a concrete physical sense, the thinking that went into its creation? I understood that drawing was considered to be in some way analogous to handwriting, in that the specific style or presence of a person could be identified from their drawn line (Morren et al. 2012). This notion is after all considered to be an axiom of drawing connoisseurship no less, itself an extensive and well developed discipline within the context of art history. “By his line shall the artist be known” goes the maxim, according to the art historian David Rosand in his superb treatise on the phenomenology of drawing, *Drawing Acts* (Rosand 2002). Drawing connoisseurship is, according to Rosand “a discipline which has always recognized the fundamental subjectivity of its operation, respecting intuition and celebrating the ‘good eye’” (Rosand 2002, 18).



Fig. 1 – Graham-Apelles

#### **The line of Apelles**

The origin for this notion actually dates back to Antiquity, with a tale on the Ancient Greek painter Apelles and his competition with his rival Protogenes to draw lines, as told by the Roman author, Pliny the Elder (Pliny, trans Jex-Blake & Sellers 1896/2012). The famous story concerns a professional competition which set each artist against each other to draw straight lines “of extreme delicacy”. Without ever actually meeting one another, they took it in turns to compete against each other as artists by drawing a single straight line on a shared canvas, each time cutting the line of the other down its length. After Apelles second attempt Protogenes considers himself beaten, and the two shake hands. Pliny therefore considers Apelles to be ‘the master of the line’ (Rosand 2002) and this story passes into history as one of the founding allegory’s upon which Greco-Roman connoisseurship was based.

What is fascinating about the story is that it enacts the fundamental assumption of connoisseurship, but that it does so in such an enigmatic and slightly baffling way. Each artist knows the other only by his line, and Pliny does not reveal what it was about their respective drawn lines that were so special. This includes the most important objective point – understanding how each artist knew the other ‘by his line’. They just knew. How the artist could be contained within his line in this manner, so that the line in effect ‘stood in’ for them while they were not present, Pliny does not say. They and their drawn lines were for all practical purposes, one and the same. According to Rosand, this story therefore enacts the fundamental assumption of drawing connoisseurship – that drawings “offer us the most intimate documents of artistic creativity and personality” (Rosand 2002, 3). But he followed this statement with the more pertinent question – but what exactly do we expect them to reveal?

It is this basic question that my overall enquiry into the drawn line is set upon examining. By beginning with questioning the extent to which the drawn line can be said to carry the thinking that underpins it, I am also forced to take note of this originary tale by Pliny. I do so because the assumption of drawing connoisseurship, that the drawn line acts an indexical trait of the artist themselves, arguably supports the secondary notion that drawing is somehow a record of thinking.

#### **A practice-based phenomenological enquiry**

##### *1<sup>st</sup> person investigation*

My aim in conducting a practice based PhD therefore was to explore this phenomenological understanding of the drawn line in more detail. I

wanted to test out in practice how the drawn line may be seen to ‘record’ thinking. I wanted to produce drawings that would seek to address the problem of unpacking how drawing somehow ‘recorded’ a process of thinking whilst also acting as an indexical record of the presence of the draughtsman doing the thinking. My aim was to address certain formal features of the drawn line as it was being drawn, according to its development as a line. My aim was to produce and analyse the drawings myself, because the question of how the drawn line functions as an indexical record of the draughtsman is fundamentally autobiographical in nature. It is for the same reason that I consider a first person investigation to be essentially eliminable from the very concept of knowledge if we are to take the underlying assumptions which support this claim for authorship seriously. And I believe from the outset that we should, for such assumptions concerning drawing have endured in one form or another for well over 2000 years.

*The ‘stream of consciousness’ as the flow of thought*

In claiming my enquiry to be phenomenological I am referring to the epistemology of phenomenology as the branch of knowledge through which I am approaching the problem (Moustakas 1994). By ‘phenomenal flow of thought’ as the specific focus to what I mean by ‘thinking’, I am referring to the process of thinking that we actively experience when considered in a phenomenological sense (Dainton 2006). This experience of thinking as a constant process has been described through the much better known metaphor, courtesy of the American philosopher William James, as “the stream of consciousness” (James 1950). The stream of consciousness was coined by James to refer to the unabated flow of thought that we feel ourselves to be subjectively experiencing if, at any given moment, we pay attention to that particular aspect of our internal mental state while we are conscious and awake.

*Phenomenology and drawing*

Alongside James, the other major philosopher to have prioritized examining the stream of consciousness from an experiential point of view was Edmund Husserl (Husserl 1931/2012, Husserl, Cairns 1999). Husserl’s approach to the analysis of conscious experience was conducted exclusively from a first person point of view, hence the term ‘phenomenological’. The focus of phenomenology as a philosophy for Husserl was actually rather simple – to analyse how we experience things, by paying close attention to the manner in which we experience them (Moran 1999). A ‘return’, as he called it, to the ‘things themselves’ (Husserl, Cairns 1999). Whilst the majority of Husserl’s work in the

area of consciousness studies is now considered by many contemporary theorists of mind to be largely outdated, thanks in part to important developments in the field of cognitive neuroscience among others, the fact that he based his investigations entirely within the subjective realm was, and remains, pertinent for my own approach through drawing. This is because ‘drawing’, considered as an art form, has been considered historically to be perhaps the most fundamentally subjective of all visual art activities (Rawson 1987). Whether or not one agrees with that statement, there is in general an understanding of the notion upon which it is based – that nowhere in nature are we presented, objectively speaking, with the actual lines and the relationship between lines that are the raw material of drawing. It was for this reason that I felt a phenomenological analysis to be the way to proceed, with a focus on analysing the subjective way we experience the drawn line to be both representational and a literal record of the artist themselves.

*Phenomenological Reduction as praxis*

Added to Husserl’s phenomenological approach to analysing subjective experience is my interest in his primary tool for philosophical analysis – what he termed the “phenomenological reduction” (Husserl 1931/2012). The ‘phenomenological reduction’ is a fundamentally practical tool. It is a method for essentially, suspending judgment concerning whatever it is you are investigating, while you investigate it. Using the reduction as form of praxis, one does not pass judgment concerning the veracity, or otherwise, of the claim that one is investigating – one merely ‘brackets’ it, effectively putting its assumed veracity to one side – out of play – while you set about inspecting in a systematic fashion the claim contained within it. It is related to the professing of doubt as practiced by the Greek Sceptics, although in his published writings Husserl was adamant that one did not use the reduction to profess doubt in this manner – one simply withheld any opinion, for or against, until the investigations were complete. (Husserl 1931/2012). As such, it functions as the overall strategy I employ for guiding my enquiry along its path. The aim within this paper is not however, to prove the veracity of the reduction from a philosophical standpoint. On the contrary, I believe that the practice of it does.

**Research Residency at the Centre for Recent Drawing, UK**

*Thinking Through Outline: 1<sup>st</sup> drawing series*

In order to test out the extent to which the drawn line is able to record or ‘capture’ the stream of thought in a direct way, I devised a process

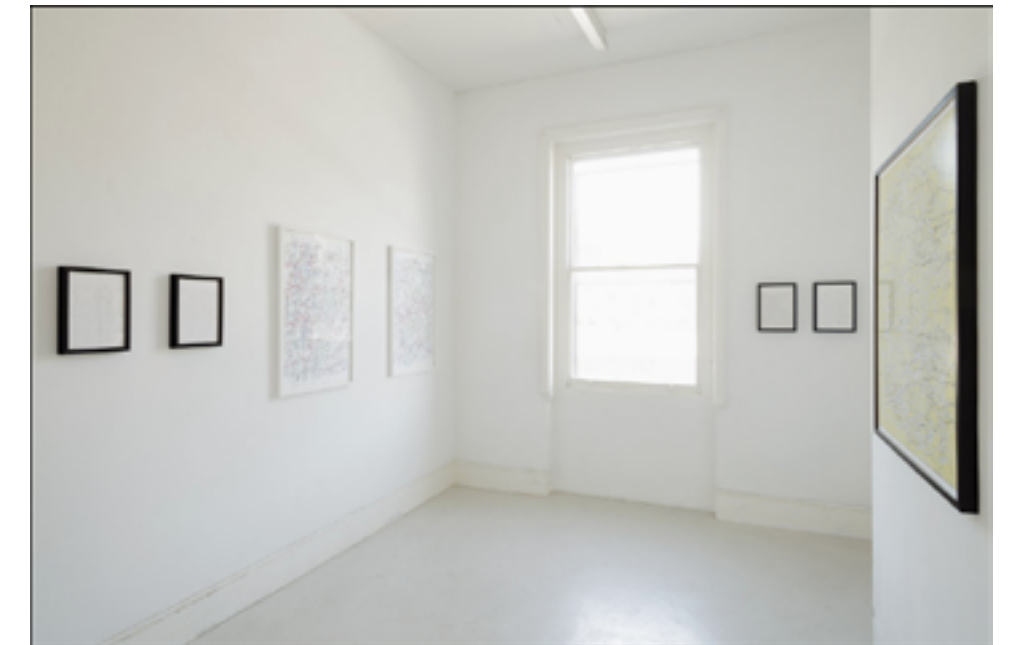


Fig. 2 – Graham –C4RD 1

Fig. 3 – Graham – C4RD 2



of continuous line drawing that would take place according to a strict set of rules. These rules would limit the drawing activity to trying to pin down, in continuous fashion, whatever I was thinking about whilst I was drawing. My aim was to produce drawings that would record this ‘stream of thought’ in real time. Initially, the focus was to be solely on

producing representational ‘outline’ drawings, hence the title of the residency – Thinking Through Outline. My aim was to produce drawings during a finite amount of time, where the aim of the process was to ‘outline’ sketch whatever I was thinking about, as I was thinking it. The amount of time I gave myself to draw within was 20 minutes. This is fixed for all my serial drawings, as was the size of the paper I draw upon.

Fig. 4 – Graham – TTO.1



What I had in mind, and what the residency was initially tailored towards, was developing a process of continuous line drawing, one that would not allow for corrections or any form of re-drawing to occur. I wanted to see what previously unexamined elements from my stream of thought the process of continuous drawing might pick up. My aim

Fig. 5 – Graham – TTO.2



was to record in a ‘seismographic’ fashion, elements within the stream that were perhaps too fleeting or transitory to be picked up and included in speech or writing. William James referred to these as the ‘transitive parts’ of thought (James 1950) in reference to the fact that we appeared to move through these transitory stages as we pass from one substantive thought to the next in sequence.

**Evaluation of drawings**

In evaluating these drawings however, I soon realized that this was just the beginning of the process of analysis. To be more specific, I felt that I had perhaps jumped the gun somewhat. By outlining ‘things’ I was in effect, drawing representationally. In so doing, not only was I easily able to identify within the line certain things I was perhaps thinking about whilst I was drawing, but that also I, and others, could tell it was me who had drawn them – my drawing style is quite distinctive, and was much in evidence. So far so good – my thinking was in evidence, subjectively speaking, to a greater or lesser degree, and so was I. But these drawings, as primary research material, hadn’t really told me anything I didn’t already know. That my particular *self*, my particular ‘mode of being’ in other words, could be in evidence through the outlining of representational ideas unique to my ‘style’, was not in doubt, nor had it ever been. I decided that the question of the extent to which ‘I’ was present in this kind of drawing wasn’t really the question. There needed to be a deeper level to what this implicit expectation of drawing as being somehow ‘revealing’ rested upon. (Fig. 6 overleaf – Graham – TTO.3)

By following the reduction as praxis, I then bracketed the outline series, putting it to one side, and stepped back. I asked myself whether I was assuming the *entire* line that was drawn, from the literal ‘point’ of its inception up to the point at which it began to act in a representational capacity, was therefore going to work in the same way? Could a dot on a page be seen to ‘carry’ the thinking behind it in the same way as a representational drawing? Could a dot or a simple mark even, be viewed as autobiographical? Could it function to carry any sort of communicable content in a similar way to an drawing that demarcated between one thing and another thing? Could a mark or a point refer back to me, directly, and not be confused with another’s ‘dot’ or another’s ‘mark’? Surely, a mark on a surface could not be identifiable as a particular *someone’s* mark...or could it? Although these were undeniably subjective questions, my enquiry was located with a specifically subjective discourse – phenomenology, according to a fundamentally subjective discipline – drawing. Added to this was the fact the assumption I was exploring was based within an unashamedly subjective discourse like drawing connoisseurship. Taken together, it was clear to me that I must continue in this subjective vein and pursue the logic of the reduction along its path.

**Point, Mark, Line, Outline: 2nd drawing series**

The answer to these questions was therefore, that I wasn’t sure. But I appeared to be assuming certain answers by jumping straight into



Fig. 6 – Graham – TTO.3



recording my thoughts through a focus on outline. By bracketing the outline series, I then decided to subdivide my understanding of the line prior to this point, according to its formal development in becoming an outline. I subdivided the line under the headings point, mark, line and outline. By sub-dividing the drawn line up in this manner, I was reflecting on previous writers on drawing who had attempted similar

(arbitrary) divisions of their understanding of the drawn line. In this respect I am referring to the writer Martin Newman and his particular understanding of the trait with respect to his discussion of the work of Avis Newman (Newman 1996). Essentially, this followed the notion that the 'mark', as it develops, can be understood as becoming a 'line'. The line in turn, continues its progression to become an 'outline'. At the point of 'outline' we are also brought up alongside the concept of the contour, which is similar, but subtly different (Rosand 2002). This subdivision follows an admittedly idealized progression of the line as it is being drawn. However, a similar progression of the line can be found in Paul Klee's well known Pedagogical Sketchbook, where he famously 'took a line for a walk' (Klee, Moholy-Nagy 1953). This began with the lines inception as a point, and continued through the book right up to its passage into infinite movement, or energy, when considered in the form of a circle.

(Figures. 7, 8 & 9 overleaf – Mark 1, 2 & 3)

#### **Evaluation of drawings**

Although I do not refer to these drawings as 'automatic', for I feel the term is misleading, they nevertheless have a relationship to that concept, in a visual sense at least. For reference purposes a closer analogy might be the automatic-type drawings produced by the artist Henri Michaux (Michaux, De Zegher & Sieburth 2000). Like Michaux, I produced a repetitive series of strokes on each page that corresponded to the form of the subheading I was working within. Each stroke of the drawing implement was produced during a three second long period of time for all the drawings, so as to maintain a kind of parity between them for cross-comparison afterwards. Three seconds is also the period of time that psychologists assess to be the duration of our perceived 'present moment' within consciousness (Poppel 1988). I will return to the relevance of this concept again shortly.

(Figures. 10, 11 & 12 in two pages – Line 1, 2 & 3)

Certainly, the drawings within each series labelled 'point', 'mark' and 'line' had none of the directly representational capacity that the 'outline' drawing series contained. Despite this, through their various differing arrangements of strokes I became aware of subtle changes to mood that appeared to be visually evident. When I say evident I am referring to the degree of formal difference between each completed drawing. This was of course a subjective assessment, but one that was revealing nonetheless. Heidegger had already established that 'mood' was one of the defining characteristics of Dasein, evident within the very notion of

what consciousness is understood to be, at least in a phenomenological sense (Heidegger 1976). Dasein, in its nature of 'Being-in' was always already 'within a mood'.

(Figures. 13, 14 & 15 in three pages – Outline 1, 2 & 3)

My overall evaluation of these the drawings resulted in this. I realized there was always going to be found a degree of subjective and circumstantial evidence for the draughtsman to be implicated 'within' their drawn line, whether it was through something purely subjective, like a perceived mood, or something more objectively verifiable, like a discrete thought which was formally 'outlined'. The evidence for conscious activity, and for a flow of thought that produced the drawing, was therefore never going to be entirely in absence, especially if we are given the prior knowledge that it was drawn by hand. But I felt this finding was not yet sufficient as an end point to my enquiry. I still had not arrived at a satisfactory answer for how the thinking was fundamentally understood to be carried within the line, even when that line was no more than a mark or a dot. The fact that the question was subjectively posed did not diminish the notion. The axiom of drawing connoisseurship has remained an axiom despite its subjective underpinnings, and will likely remain so despite supposedly 'objective' protestations to the contrary. I therefore had to logically try and proceed through what I was presented with, as I was presented with it, by following the phenomenological reduction. I felt I was required to consider what might support this assumption, by inquiring what lies beyond the notion of the line as it was drawn, to consider the concept of the line itself.

Before I do, I will return again to the notion put forward by earlier writers on this subject as a reminder of the problem. In doing so, I find a clear argument that the line itself should, by its very status of having been drawn by hand, reveal the presence of the maker within itself;

"The self-reflexivity of the drawn mark, alluding to its own making, quite naturally implicates the maker, returning us to an axiom of connoisseurship enacted in the line of Apelles: the presence in the drawing of the draughtsman. In the assertion of its autonomy, its innate resistance to the purposes of representation, the line recalls the process of its becoming through the act of drawing, the gesture of the draughtsman." (Rosand 2002, 13)

#### **Subjective divisions of the line**

With the phenomenological reduction as praxis, I therefore bracketed this point of impasse I had seemingly reached, putting it to one side, and stepped back. I asked myself whether, logically speaking, 'I' was not

Fig. 7 (left) – Mark 1

Fig. 8 (centre) – Mark 2

Fig. 9 (right) – Mark 3

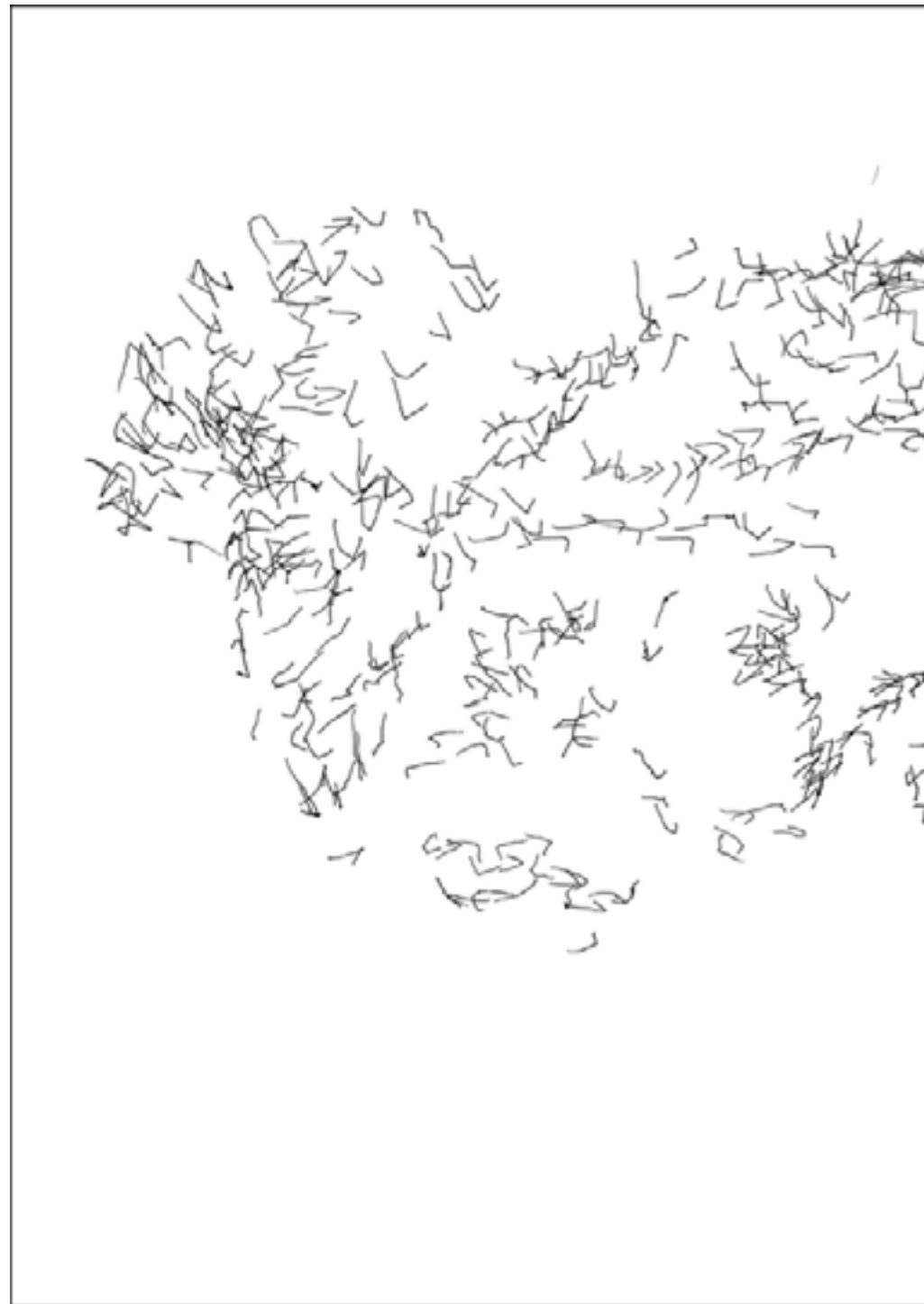
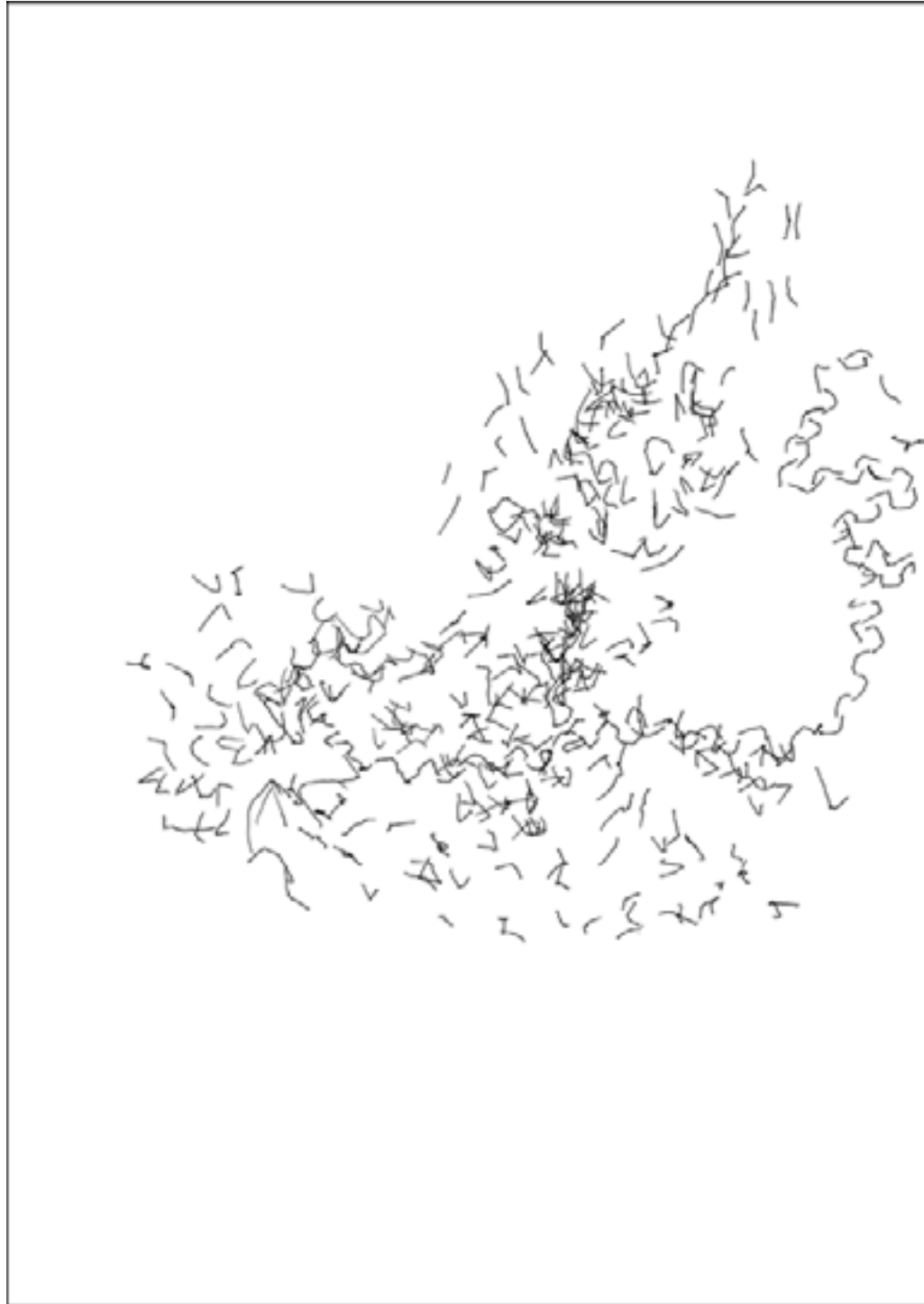


Fig. 10 (left) –Line 1

Fig. 11 (centre) –Line 2

Fig. 12 (right) –Line 3

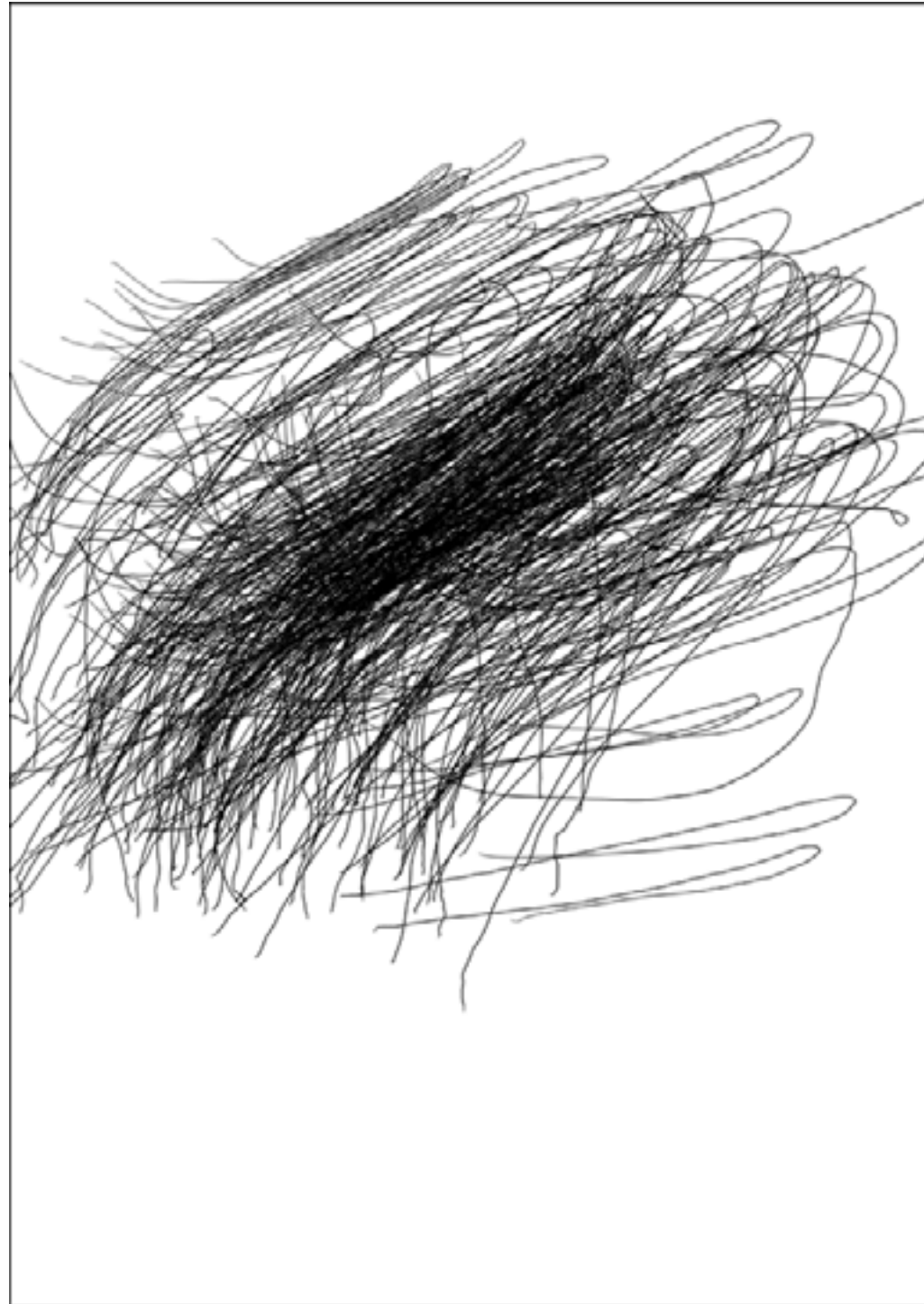
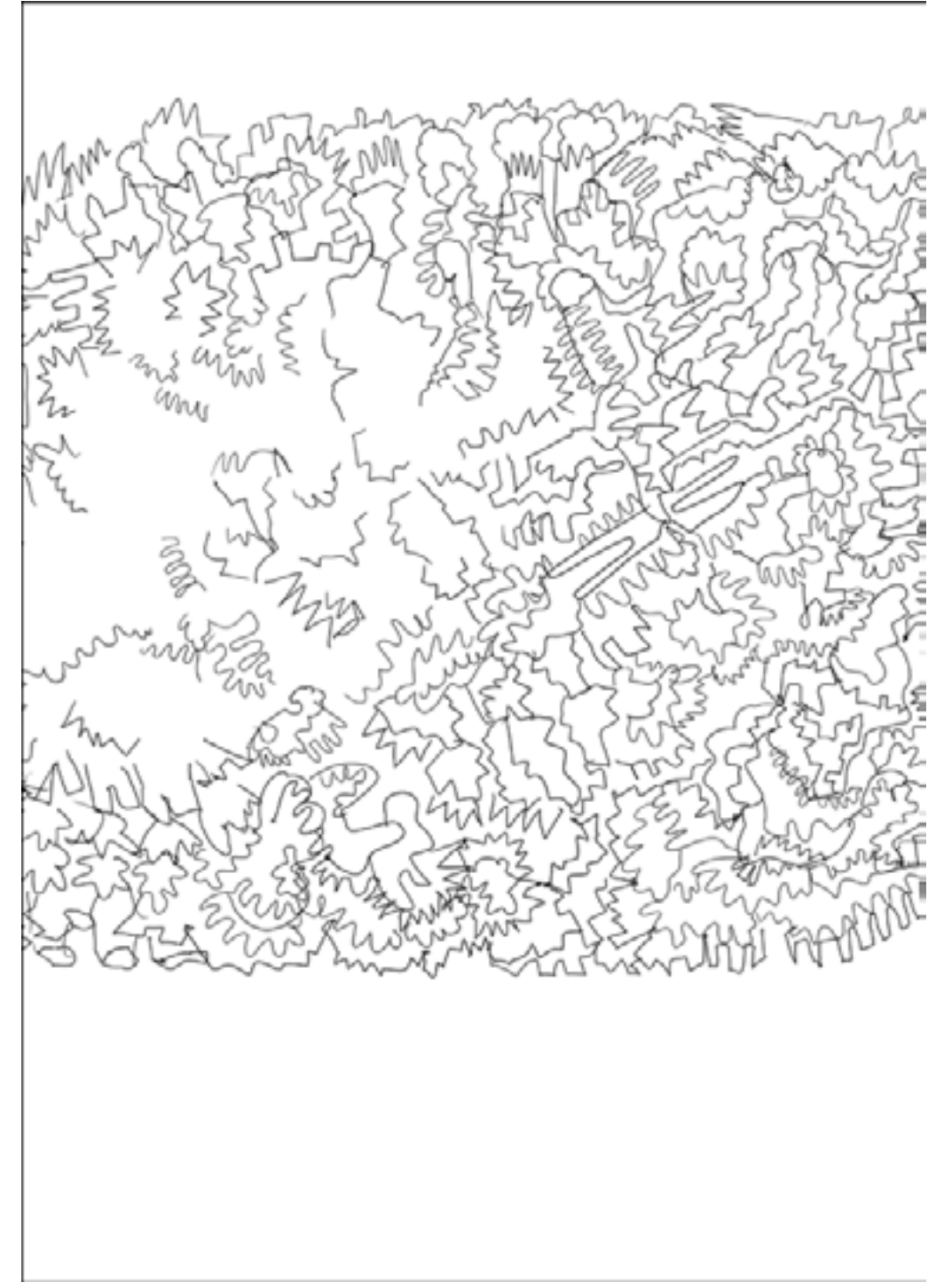
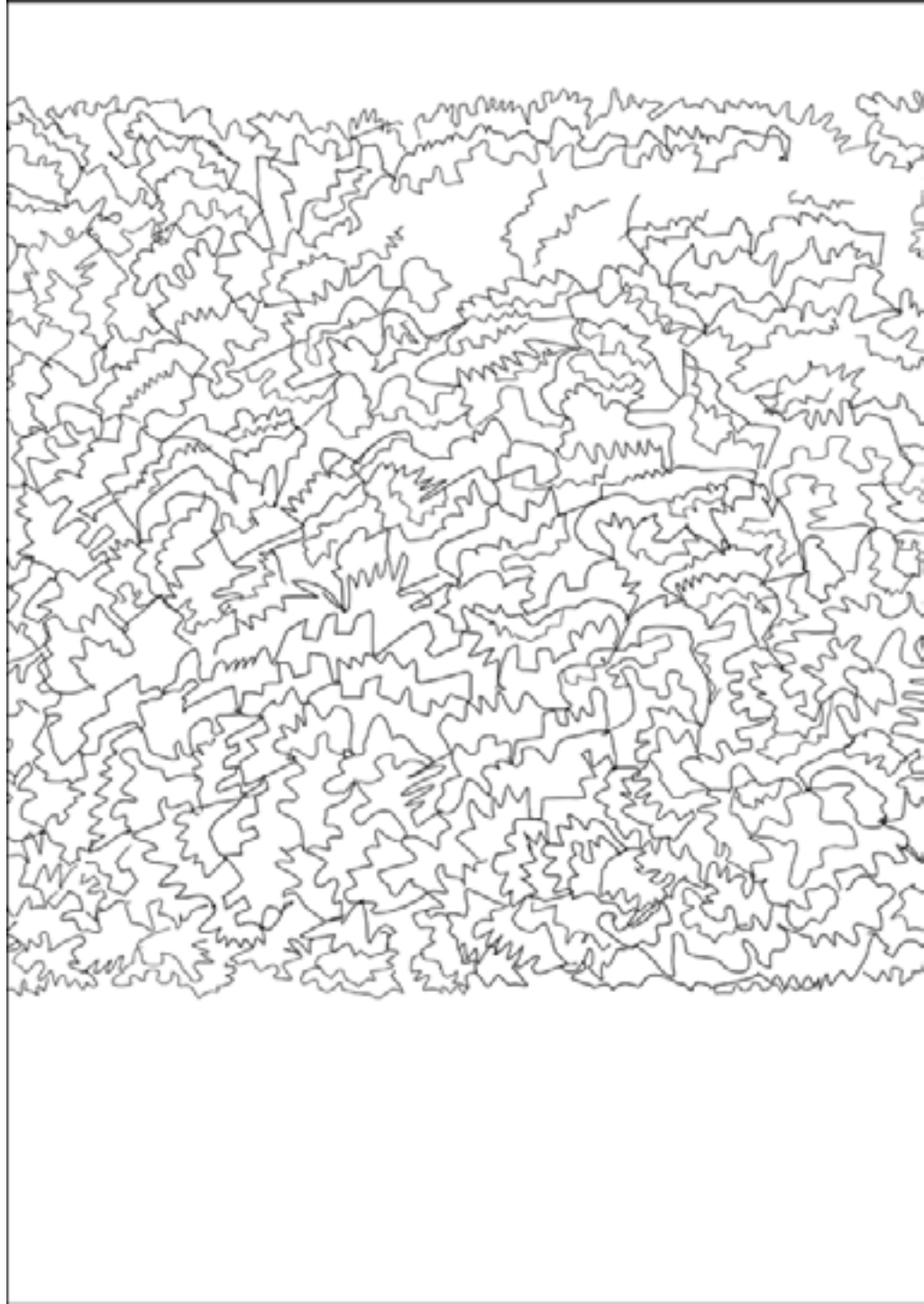


Fig. 10 (left) – Outline 1

Fig. 11 (centre) – Outline 2

Fig. 12 (right) – Outline 3



simply present throughout the entire length of the drawn line, from the point of its inception to the point at which it ended? If this was indeed the case, then the question concerning ‘where’ my thoughts might be located within the line, needed to be asked differently. The premise upon which this whole notion rested was I realized, an assumption. It could not be ‘solved’ by finding circumstantial evidence in a physical sense. By bracketing this notion, I realized that there was of course an element that I had overlooked, at least at first. This was an unnoticed element that I had been working with, and one that needed to be identified. This element concerned the simple fact that the point of division, so to speak, between these formal subdivisions of the line is of course, arbitrary. The question of ‘at what point along its development does the drawn line proceed from being considered a ‘line’ into being considered an ‘outline’?’ is a question that must be asked when such a seemingly subjective division is set up. It is of course also a fundamentally subjective question without a fixed answer. But by asking it I came across what I felt the true and underlying nature of the problem to be, by recognizing an analogy with a similar problem in a different dimension from space. I am referring here to the dimension of time

#### ***The moment of ‘NOW’***

The problem I refer to is this. By asking the question of where we might choose to divide a drawn line according to its formal division into subjectively understood categories, is therefore an arbitrary question to a certain degree. Likewise, the question that this rests upon, of asking where within the line the draughtsman might be ‘seen’ to be present, is also subjective. But this question is perhaps similar in scope to the question of when we might choose to divide time according to how we subjectively experience it passing. For example, we might choose to ask the question of when is the moment of ‘now’. When is ‘NOW’? Whenever we choose to ask the question.

#### ***Conclusion: Metaphysical Lines***

Within lived experience, and from a phenomenological viewpoint, we find we cannot separate our concept of time from our concept of space, and vice versa. We encounter them together. However, by introducing the topic of time into my enquiry, I am in fact introducing an inescapably non-physical dimension to the question. While time is no less real for us than space, our understanding of it is very different. Put simply, we perceive time in a different way to space. It is beyond our literal understanding in the way that space is. Current philosophical discourse concerning the problem of how we persist through time makes this clear

(Sattig 2006, Dainton 2004.)

When we try and move from the domain of that which is ‘real’ before us – that which is present and which is physical, into another realm that we can’t see or prove objectively, we are entering the discipline of metaphysics. To paraphrase Heidegger, the Greeks had a word for that which was simply present before us. It was *phusis*. Being which simply ‘is’, present and at hand. This was, according to Heidegger, the much more elastic Greek origin of the word *phusis* before it became the word ‘physics’ that we use today. But the Greeks also had a word for that which is “away over something” or “over beyond” (Heidegger 2000, 18). This word was *meta*. Away and over that which is present before us is: *meta ta phusika*. Metaphysics.

For the Greeks, one of the most enduring concepts for how they thought that we should live, was that we should learn to live within the *meta*. That we should inquire deeply into the nature of the world we are presented with, by inquiring away and over the horizon, into the one that we are not. The fact is, we live in a world where we encounter a horizon line. It was from this cardinal point that the Greeks took their cue.

#### ***The Specious Present***

With respect therefore to the question of where we might choose to subjectively divide a drawn line according to formal spatial properties that are themselves subjectively understood, I realized that the question shared a similar formal problem with another understanding of the line. This understanding does not concern the dimension of space, but the dimension of time. I am referring here to our experience of time, and the way in which we choose to divide it as we encounter it in experience, according to the moment of ‘now’. Phenomenologically speaking, just as we encounter space and time and together (as extension and duration) (Bergson 2001) we also find that our ‘present moment’ in experience is not an ‘instantaneous’ nothing, but it is rather a durational something (Varela 1999). It is our “specious present” as William James famously called it (James 1950). Our present moment as we encounter it, according to phenomenologists like Husserl (Husserl 1966) and more recently cognitive neuroscientists like Ernst Poppel (Poppel 1988) and Francisco J Varela (Varela 1999). is therefore an extension – a duration in other words. But the point is, no matter how long we choose to define the present moment to subjectively be, we are still faced with a paradox – that we appear to inhabit a ‘moving present’. It is what the word ‘stream’ in the metaphor ‘stream of consciousness’ refers to: time appears to flow by us, as evidenced by our thoughts which appear to us to pass sequentially one by one. Time, understood in this way, is also

understood as linear.

To return to the question. If we ask ourselves ‘when is the moment of now?’ within time, then the answer is ‘whenever you choose to ask the question’ (Poppel 1988). Following this realization I asked myself one final question. I asked whether or not in reality the question of where ‘I’ or my thinking might be ‘contained’ within my own drawn line, was a bit like asking when ‘I’ might be ‘located’ within my own time-line? When is now? It is now. Within a phenomenological account of experience we find we cannot separate time from space. But by linking the two dimensions together through the formal concept of the line, we find we can share a problem between them on a conceptual level. The question of ‘what’ is contained within the drawn line then becomes to a certain degree, metaphysical. It is now related, in an ontological sense, to question of ‘when’ something exists. And it does so by becoming a question of persistence (Sattig 2006)

#### ***Line and Time***

To begin with, on a basic level there is the idea that the relationship between line and time is perhaps more direct than between line and space. To paraphrase the philosopher Barry Dainton on this point, space as an entity, whether you consider it to be substantival (space as something you pass through) or relational (space as constituted of lines, being the distance between two points) it still exceeds line as a concept simply by virtue of possessing three dimensions (Dainton 2004). Time on the other hand, consists of a succession of moments, and so is one dimensional. We can therefore conceptualize it to be line-like in a way that space is not. This is why it is not for nothing that we speak of the ‘time-line’. This question of how we persist through time however, is essentially metaphysical in scope, for it concerns whether or not there are such things as temporal parts that persist much like spatial parts, via a four dimensional theory known as perdurantism, or its competing three dimensional theory, endurantism, for which there are no such thing (Lowe 2002, Dainton 2004). However, for the purposes of this discussion I should like to, metaphorically speaking, draw a line there for the moment. For this discussion about competing theories of time becomes fundamentally ontological in its scope – which is another way of saying it is an argument about what exists. What I will say is that the standard ontology – endurantism – regards persisting things as akin to points, that are whole at each moment along the time-line. By contrast perdurantism regards things as being akin to lines – they are extended through or along the time-line by having temporal parts. Neither ontology has the upper hand within the current philosophical

discourse on time – there are competing theories and arguments for both (McKinnon 2002, Sattig 2006)

#### **The point that persists**

However, this concern for what is understood to ‘exist’ within a spatial and temporal understanding of the line, brings me to the last point I would like to make, in consideration of this paper as a report on progress. The question of how we persist through time, if time is line-like, may offer itself as a useful way to think about the question of what exactly the drawn line is said to contain. The story of Apelles by Pliny contains this very germ of the fundamental assumption, that the drawn line is the artist, contained somehow within their line. The drawn line somehow functions as an indexical link to our very mode of Being in other words. By following the reduction as praxis, I have tried to pay careful attention to what my drawings have been telling me as they have developed, in terms of the direction my enquiry should take. As a subjective enquiry it could of course have taken many different directions, but the fact that I now find myself at a metaphysical consideration of the drawn line is either a radical departure from the point at which I started, or a radical return. Or possibly both.

We are present throughout our lived timeline as we are present throughout our drawn lines – at all moments and at all stages. We are ‘there’ from the point of our inception, to the point of our departure. In following the phenomenological reduction as praxis, the seemingly physical question becomes metaphysical in scope. If we take a perdurantist perspective to time, we find we are distributed along our timeline in a manner analogous to a line we draw in space. But even endurantism permits us the paradoxical problem of the moving present. The concept of the line prevails. Asking ‘when’ we are in time becomes as ontologically complex as asking ‘where’ we might be found within our drawn lines. ‘Dates’ and ‘times’ as temporal divisions are at root, as fundamentally arbitrary to divide as point, mark, line and outline are spatially. By asking how we are found within our concept of the line, the question of authorship becomes a question I believe, of where we are to be found in time.

I would like to end this talk with a final quote from Pliny, concerning the enigmatic way in which he ends his tale of Apelles of Kos. The manner in which Pliny ends this story is strange, and yet although the tale has provoked an array of differing interpretations from various art historians down the ages, nowhere can I find an interpretation of this particular section. In light of this, I should like to offer my own, rather

more speculative version.

Speaking of the destruction of the canvas on which Apelles and Protogenes carried out their competition and drew their lines, Pliny has this to say:

“It perished, I am told, in the first fire of the house of the Caesars on the Palentine. Formally we might look upon it: its wide surface disclosed nothing save lines *which eluded the sight*, and among the numerous works by excellent painters *it was like a blank* and it was precisely this that lent it surpassing attraction and renown. (my italics)” (Pliny, trans Jex-Blake & Sellers 1896/2012, 123)

*A blank canvas* in other words. There are no lines to see because perhaps, this is not a tale concerning physically drawn lines, but a wonderful riddle that points to the underlying metaphysical problem upon which the question rests. A riddle that uses the analogically related question of present authorship (how does the draughtsman persist within his drawn line?) to refer to the eternally vexing, and seemingly non-spatial question – how does man persist through time?

The “point that moves” (Rawson 1987 does not just refer to the way in which the drawn line comes into being in a spatial sense. In being drawn, it refers inescapably back to the draughtsman who produces it. By following this kinetic development of the line, the draughtsman then realizes that he too is ‘the point that moves’ – only he comes into being through time.

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# Hannibal | The Digital Dilemma: Product versus Process in Architectural Education

## Abstract

Architecture is a visual subject and students acquire a visual value system during their education (Brown and Moreau, 2002). The digital revolution and improvements in Computer Aided Design (CAD) mean that the prevailing paradigm in architectural education has been to prioritise ‘design as product - in terms of visual and graphic output - rather than design as a dynamic and interactive process’ (Nicol and Pilling, 2000).

Digital software provides students greater options in exploring architectural design ideas; however technology and the design process do not always sit comfortably. Indeed when adapting new technologies to traditional design processes dysfunctional relationships can develop between the tools and the task, due to traditional design practices being displaced by tools with the wrong affordances (Chastain et al, 2002).

Drawing facilitates thinking and supports emergent ideas and free-hand sketches as external representation are essential for crystallizing design ideas in early design processes (Suwa and Tversky, 1997). Indeed unanticipated relations and features often suggest ways to refine and revise ideas, the - sketch, inspect, revise cycle - comparable to having a conversation with one’s self (Schön and Wiggins, 1992). However a current concern is that the increasing reliance on technology undervalues the role of drawing and bypasses the creative processes that can lead to innovation.

This paper argues that the introduction of digital technologies too early in architectural education is detrimental to the development of students’ design abilities, and hinders both ambition and project realisation. This is examined through the first year design studio which, via a series of drawing-led design projects, has confronted the idealisation of drawing as product in favour of drawing as process. The findings of the study conclude that free-hand-drawing remains more effective in developing both early stage critical thinking and final representation techniques.

## Biographical Details

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Claire is an architect and senior lecturer at the Leeds School of Architecture. She completed her PhD at Liverpool University supported by an EPSRC Doctoral Award, which examined the role of digital sketching in architecture. Her main teaching and research interests include drawing, visualisation and communication, relating particularly to the ways in which we engage with the creative design process. With a background in fine art she is also interested in the blurred lines between art and architecture.

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Ann is a chartered town planner and an associate lecturer at the Leeds School of Architecture, where she teaches in the undergraduate design studio. With a background in architecture she has extensive experience of professional design disciplines and an interest in the role of ‘craft’ as a tool to augment design thinking, communication and collaboration. She is currently studying for her PhD at the Bartlett, University College London.

## Drawing - A Shifting Educational Approach

‘Drawing is indispensable as a tool and has always been considered the basis of architectural education’ (Moneo, 1987:2) however the way in which we have approached drawing in the design studio has altered dramatically during the last ten years. Architects in practice utilise a number of different drawing techniques ranging from simple hand sketches to highly rendered computer representations, the range of which play key roles in the development and communication of architectural ideas. The advent of new technologies however means that the focus in education has shifted towards digital tools; in part led by educators keen to embrace new methods of teaching, in response to the efficacious demands of digital reproduction in architectural practice, and students themselves who possess familiarity with a broad range of digital techniques.

Of particular note in architectural education has been the increased use of two and three-dimensional computer programmes during the early

design stages, tools which had traditionally been utilised towards the end of design projects. This is due to developments in two-dimensional software such as AutoCAD and three-dimensional digital ‘sketching’ tools including SketchUp now offering more user friendly user-input commands than traditional coordinate-based 2D software. However the prevalence of the computer at the earlier design stages now presents us with specific challenges; a compromised design process, a lack of design ambition, and the assumption by students that there are ‘right and wrong’ answers.

## Importance of Hand-drawing

In order to understand the impact of computers upon the design process it is firstly important to examine the use of drawing during the early stages of design. Hand-drawing offers flexibility and is often the ‘first visible form of thought’ (Abraham, 1991:12) during the design stages, due to its simplicity and accessibility. Indeed sketches provide a flexible and spontaneous tool of enquiry and have the ‘ability to transcend any reference to reality’ (Cook, 2008:177).

Sketches are also important in the creative process because they function as a means by which designers can interact with and make records of their mental imagery (Larkin and Simon, 1987) acting as a production system that helps designers generate concepts using the two-way interaction between mental concepts and sketch representations (Herbert, 1993; Goldschmidt, 1994). Several cognitive scientists argue that drawing facilitates thinking and supports emergent ideas (Do, 1998) and Suwa and Tversky (1997:385) consider that ‘freehand sketches as external representation are essential for crystallizing design ideas in early design processes’.

## Spirit of Inquiry

Architectural education takes a Problem-Based Learning approach, and the key to a successful design studio is encouraging students to take risks and engage in a deep approach to learning (Kahn and O’Rourke, 2004). Students entering courses in architecture have a wide range of backgrounds and the first year design studio has been structured to facilitate the gradual development of skills and encourage a ‘spirit of inquiry’ (Prosser and Trigwell, 1999) where learning takes place through the active behaviour of the student (Tyler, 1949; Jackson et al, 2003).

*Digital-drawing Tools*

Students are introduced to a number of studio design projects that steadily increase in size and complexity, and for the last two years the teaching approach for first year students has been to actively promote the use of hand rather than computer-drawing techniques, a deliberate move away from the current trend. This restriction of digital tools was taken to counter an observed student preoccupation with highly rendered digital images and a subsequent detachment with the design process. Previously when students were allowed to prioritise the use of digital-drawing techniques their goal shifted to finalising design ideas at the very early stages of projects, in order to leave more time at the end to digitally present their work. The prioritisation of digital tools therefore diminished design ambition, for digital-drawing was used only to concretise preconceived ideas (Pallasmaa, 2009) rather than as a tool to facilitate the design process. Effectively digital-drawing techniques were used by students to provide an instant and precise shape to an initial idea, without actively engaging with the potential of what the idea could become.

*Problems with Digital Culture*

The innate excitement for computer-aided design is understandable as the current generation has been ‘raised on digital games, the push button and the mouse’ (Barron, 2008:112). However it is observable that familiarity with highly rendered architectural images creates a superficial digital culture that limits the understanding of the background work preceding them, in particular the hours of messy working and reworking necessary to reach a critical and reasoned conclusion. Indeed these highly rendered, final images - the product of architectural design - do not reveal the search for the unknown or the ‘unresolved nature of design where conception and representation are repeated many times’ (Hewitt, 2008:15).

The early implementation of digital-drawing techniques also disrupts students’ engagement with the design process on another level, for whereas hand-drawing is the artistic medium ‘least interrupted by technical considerations’ (Petherbridge, 1991:7) the computer tends towards a retinal journey where the student remains an outsider and observer (Pallasmaa, 2009). Indeed because the software used by students does not support freehand sketching the computer actually delimits the design process (Treib, 2008) as the information inputted into the system only visualises ideas ‘already obtained in earlier design processes’ (Suwa and Tversky, 1997:387). This means that students are doing the same work twice with a focus towards commitment and

precision ‘rather than expressive avenues’ (Porter, 1997:24). In addition the affordances of current software not only fragment the design-feedback-loop but also negatively impact design ambition, with students demonstrating a reluctance to alter initial designs ‘drawn up’ on the computer due to a high time-based investment in their production.

*Right and Wrong Answers*

This reluctance to develop ideas meant that first year students effectively demoted design practice from a ‘continually mutable process’ (Newman, 2003:38) to one of fixing ideas at the early stages, thus adversely shifting their focus from one of process to product. In addition the requirement for specific and detailed digital input during the early stages of design exacerbated a student culture which demanded confirmation that they were doing the ‘right thing’. Architecture ‘differs markedly from the associated sciences of building technology and engineering’ (Lacy, 1991:40) in that it does not offer a single ‘correct’ answer. Rather it offers the opportunity to explore and develop a number of alternative approaches, many of which could be correct.

*Challenging Students*

Faced with the problem of student detachment from the design process and their limited confidence in making design decisions, all first year design studio briefs were rewritten with the specific goal of making students use hand-drawing as their primary medium of investigation and representation. By restricting the use of CAD-based software we hoped to examine the effectiveness of traditional methods of working and eliminate the notion of the ‘fixed product’ within the early design stages.

When given a design brief first year students have a tendency to think in terms of a ‘whole form’, more specifically what the final design will look like. More skilled designers however consider spaces, qualities and details as an interconnected body of complex parts that enlighten the ‘whole’ and emerge as a result of a critical design process. Rather than being fixed this process is entered into with an open mind ‘where partial solutions and details are repeatedly tested, in order to reveal and fuse a complete rendition of the thousands of demands and criteria’ (Pallasmaa, 2009:108).

*Design Projects*

The challenge in the first year studio therefore was to focus and develop design skills that could facilitate creativity and critical thinking (Lacy, 1991) without the hindrance of precise visualisation (Ehrenzweig, 1973). We began by using a brief that required students to investigate ordinary objects and then critique, evaluate and abstract their potentials. The brief was structured to eliminate any preconceived notions of what architecture should be by deliberately detaching it from formal ideas of ‘building’.

At the beginning of the project students were introduced to formal drawing techniques, in particular the architectural conventions of the plan, section, elevation and axonometric. This required them to analyse, record and understand the component parts of their object and communicate how its pieces fit together, all crucial aspects of architectural design. Although these types of drawing are perhaps more commonly

*Fig. 1 - Exploration of formal drawing techniques*

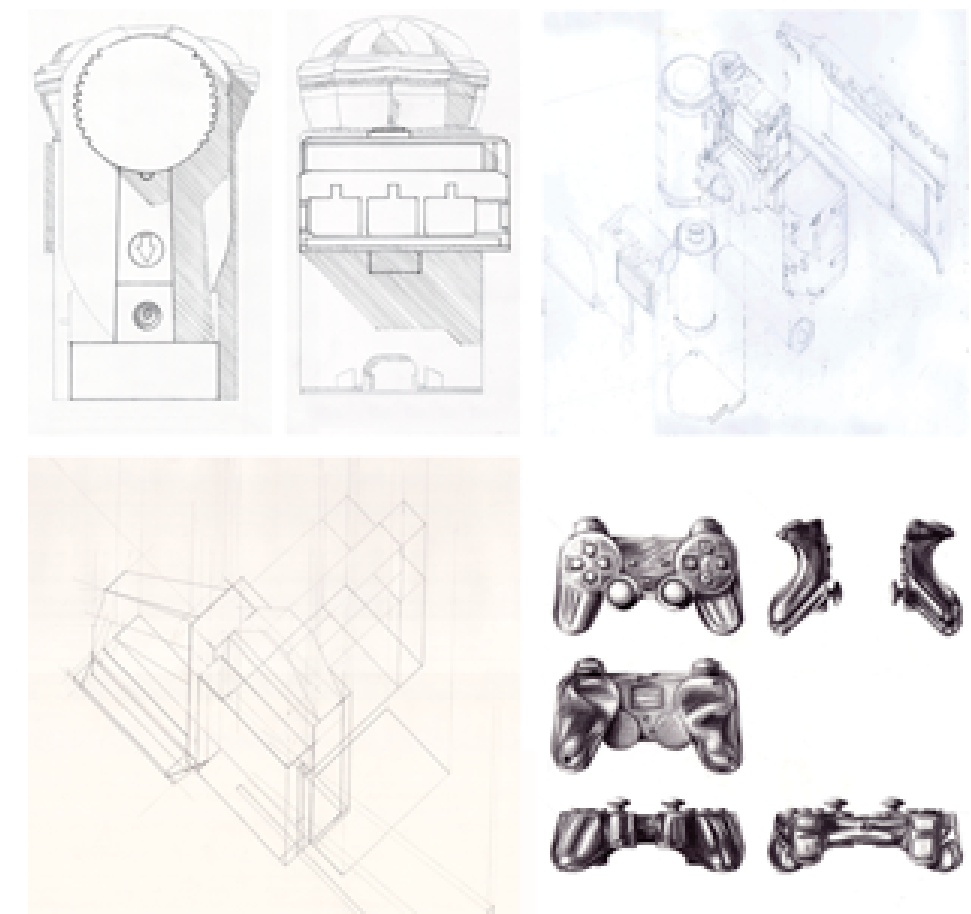
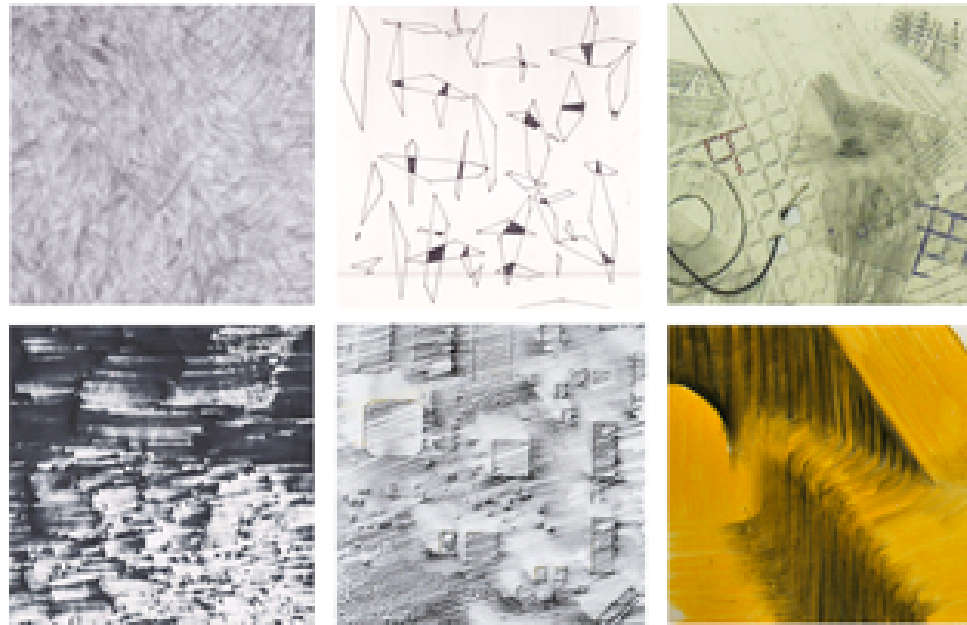




Fig. 2 - Drawing abstractions



associated with digital tools, by practising hand-drawing students were able to quickly develop their own particular expressive styles (figure 1). It is considered that the standards achieved, in their diversity and resolution would never have been possible had they attempted the exercise constrained by the computer. Indeed the characteristics inherent within the formal drawings demonstrate how architectural representation can transcend beyond mere recordings towards the sensitive interpretations of objects.

**Qualities of Space**

It is important that architectural design prioritises the quality of space above mere spatial organisation, so students then began a series of mark-making exercises in order to abstract the key spatial attributes of their objects (figure 2). The vague quality of hand-drawing allowed

Fig. 3 - Typical computer-generated process drawing



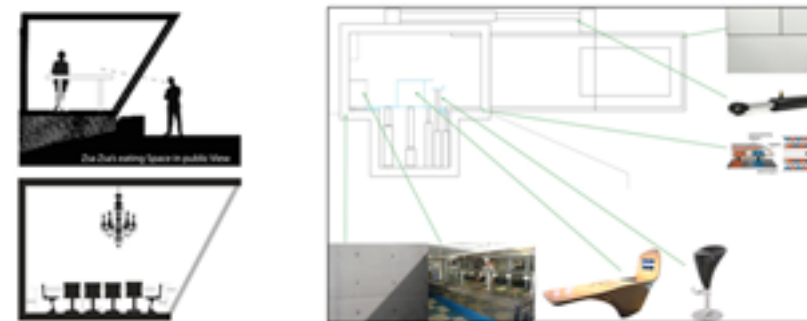
ideas to be explored and expressed without the rigid dimensional input associated with digital-drawing, resulting in output both personal and varied. In addition via the continued experimentation with different

Fig. 4 - Hand-drawn design process



techniques beyond the first product students conveyed newly abstracted marks which allowed them to ‘see into hidden dimensions’ (Sullivan, 2008:122). The design-feedback loop thus allowed them to engage with unknown and discovered ideas whilst simultaneously reinforcing the idea that there is no ‘right or wrong’ approach.

Fig. 5 - The digital and the characterless



The images not only demonstrate a set point within the design process but they also infer a number of ‘spatial variables including light, surface, scale and form’ (Porter, 1997:3). The importance of these characteristics is paramount and can define the success of architectural designs, highlighting the essential need to engage with these qualities during the early design process.

**Process Drawings**

As we progressed through the academic year the design projects increased in complexity and students were introduced to more detailed contextual and theoretical design issues. Although the principles of

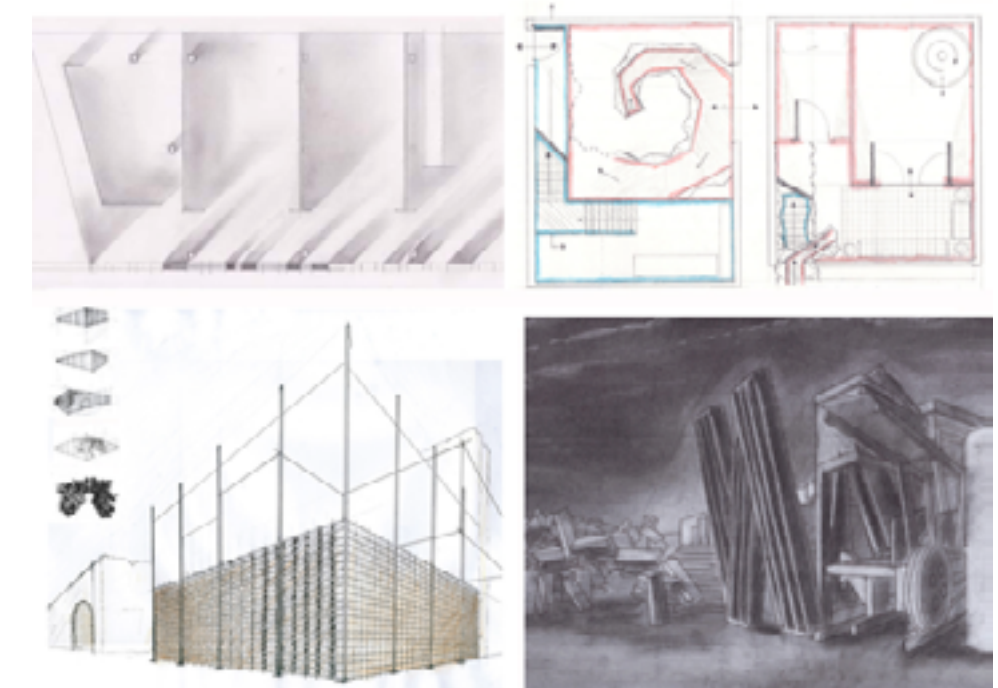


Fig. 6 - Expressive communications of space

design investigation had already been clearly identified, when faced with having to consider an increased number of variables in new projects, there was a tendency for some students to disengage with ideas of spatial quality and focus instead on technical issues regarding layout. This trait was augmented after the attendance at an introductory AutoCAD session during the middle of semester two, where having been introduced to the software some students immediately rejected hand-drawing as an explorative tool in favour of the digital-drawing.

This resulted in ideas being fixed very quickly and a focus shift towards repositioning flat, preconceived ‘shapes’ rather than exploring and defining qualities of three-dimensional space (figure 3). Having been dictated by the affordances of the computer the design iterations reveal no variation in lineweights and appear static in both aspiration and viewpoint. The drawing has become a procedural digital record where rather than demonstrate engagement with an imaginative design process the product hinders ambition.

In contrast, those using a hand-drawn approach engaged with the doodle (Gombrich, 1999) and allowed the speculative and evolving characteristics of drawing to define shapes and their three-dimensional qualities (figure 4). Following the same design brief (as figure 3) but

unencumbered by the need to provide fussy detail (Barron, 2008) the drawings demonstrate a fluid reworking of ideas relating to scale, tone and view within a dynamic and investigative process that informs the final design.

#### Final Representation Techniques

Students who fully engaged with hand-drawing throughout the design process were also far more successful in presenting their final ideas. This is because digital techniques reduced the communication of ideas to flat and mechanistic diagrams devoid of spatial quality (figure 5) an issue partly due to unfamiliarity with techniques but more importantly the limited experimental capabilities offered by AutoCAD software. Digitally depicted spaces were generally fragmented from their context and material characteristics relegated to a secondary 'cut and paste' exercise at the periphery of images. When the aim of the final representation is to entice the viewer via a visualised statement of spatial ambition, the digital approach succeeded only in communicating relative dispassionateness (Cook, 2008).

In contrast the hand-drawn visualisations (in figure 6) adopt more individual and unrestrained styles which immediately identify the design philosophies of the author (Porter, 1997). Overarching ideas of space and materiality are communicated using varied expressive approaches that contextualise the designs and allow the viewer to engage with the 'whole'. In addition 'every weight, shade, thickness and velocity...carries a particular meaning' (Pallasmaa, 2009:100) which contributes to an innate quality of space.

#### **Conclusion**

Drawing is 'considered the best way of developing intelligence and forming judgement' (Viollet-le-Duc, 1879:210) however when teaching in the first year design studio it is essential to differentiate between types of drawing due to the diverse opportunities they afford. The ubiquity of digital culture means that there is a temptation for students to utilise digital-drawing techniques early in the design process, and in response to this position the research sought to determine whether hand-drawing has more appropriate affordances for fledgling designers than its digital counterpart.

The findings show that digital techniques disrupted engagement with the design-feedback-loop and prioritised drawing as a product, an approach which is considered unspontaneous and appropriate only when 'the thinking is 90 percent done' (Cook, 2008:21). Conversely

hand-drawing enabled students to positively engage with the inherent complexities of design using drawing as a process to investigate spatial qualities. Therefore although one acknowledges that technological advances have 'completely changed countless aspects of production' (Pallasmaa, 2009: 95) it is considered that hand-drawing plays an unparalleled role which cannot be substituted during the early stages of architectural education.

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# Hastings | Drawing as Design Thinking: Teaching design students to think and research through drawing

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Fig. 1 – Ideation sketches by Geoffrey Smith

## How do we best adapt drawing curriculum for use in the design process?

For many professional designers, including me, any situation can be viewed as a “design problem.” Take this presentation, for example – a design problem. I approached it by researching, sketching and drawing throughout the process. So naturally, when I think about how to get design students to “think through drawing,” I think of it as a design problem. How can I design an effective learning experience?



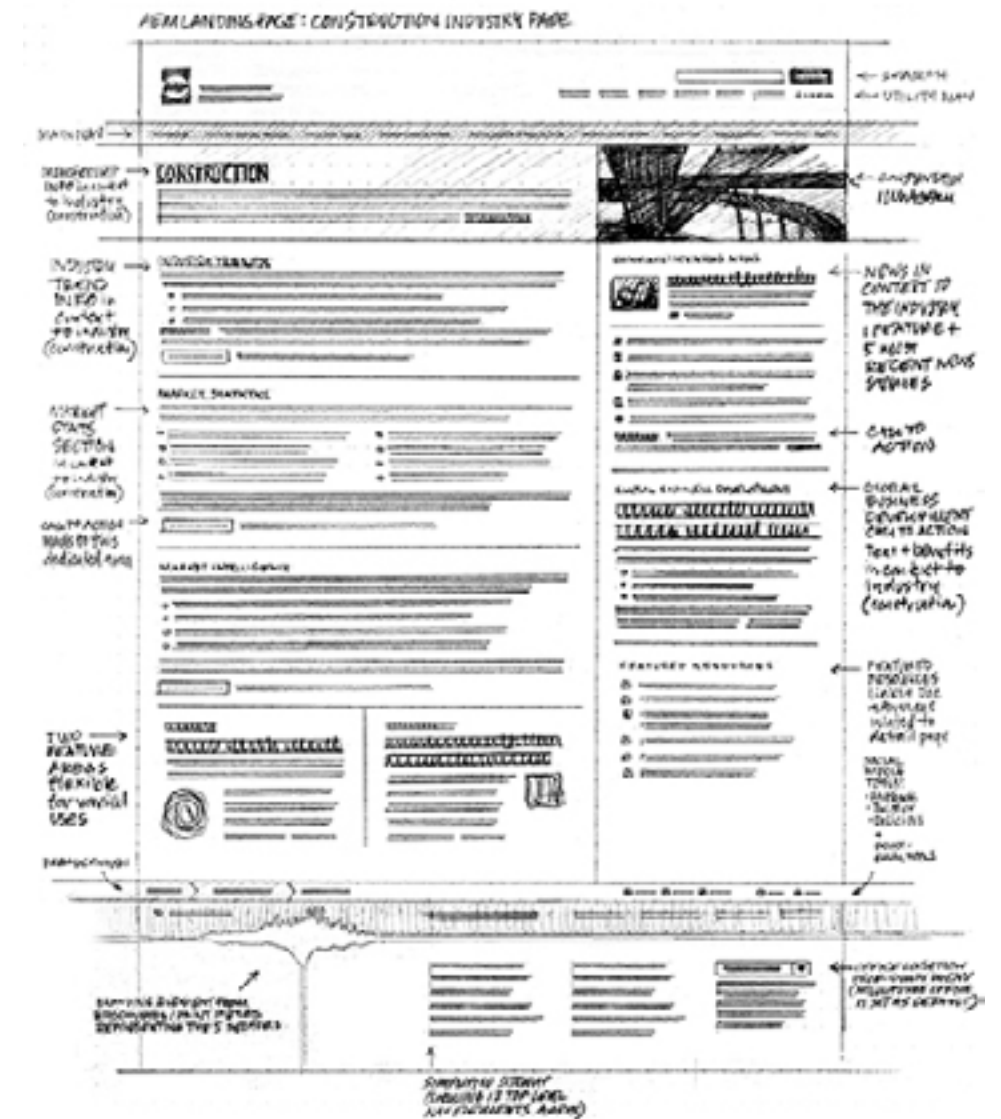
Fig. 2 – Snapshot of my design notebook

As both a practitioner and educator, design education is of keen interest to me and it seems the old art school foundational model no longer meets the needs of most interactive design students. So what model is appropriate for students that will be designing for experiences on devices? Our increasingly screen-dominated world has brought us to a critical juncture in drawing education. At many institutions, the traditional drawing programs are no longer required for design students. Unfortunately, learning to draw the figure or still life does not necessarily translate into the ability to effectively design a logo, communicate a user interface, or create a web site wireframe. The developmental needs of the ideation processes in design drawing are not met by purely observational drawing practices.

Fig. 3 (right)– Website interface drawing by Mike Rohde

Add all of this to the fact that many design students simply don’t believe that they need to know how to draw and my challenge has been multiplied. In my search to find solutions I have stumbled across experiments in drawing curriculum happening across design programs. While most appear to be preliminary drawing skills aimed at designers, some have even gone as far as integrating computers and tablets, such as the Wacom Cintiq, into their life drawing studios and courses. Most professional designers do not start the design process at a machine and there are lots of very good reasons why they don’t, so I am of the mind that it’s better not to start them off on devices.

The reason I am so keen on drawing skills for design students is because of the importance it holds in Design Thinking. The application of this term “Design Thinking,” is very broad, but in this presentation I am focusing on web and mobile UI/UX, print, and identity design. While much has been written about drawing in relationship to the education and practice



of architects, very little has been written on drawing in the Design Thinking process. This is changing, however, as more drawing researchers are investigating drawing in design and more professional UI/UX designers are speaking out on the importance of drawing at industry conferences and through trade related articles and blogs. (See attached bibliography.) While research on the cognitive significance of drawing in the design process is still in the early stages, design educators are trying to create drawing curriculums for a discipline that is rapidly and constantly evolving. So, it becomes a process of researching design drawing cognition and experimenting in the classroom at the same time. At this point I have more questions than answers and I’m also in the middle of trying to figure out how to meet the needs of my institution’s design students.

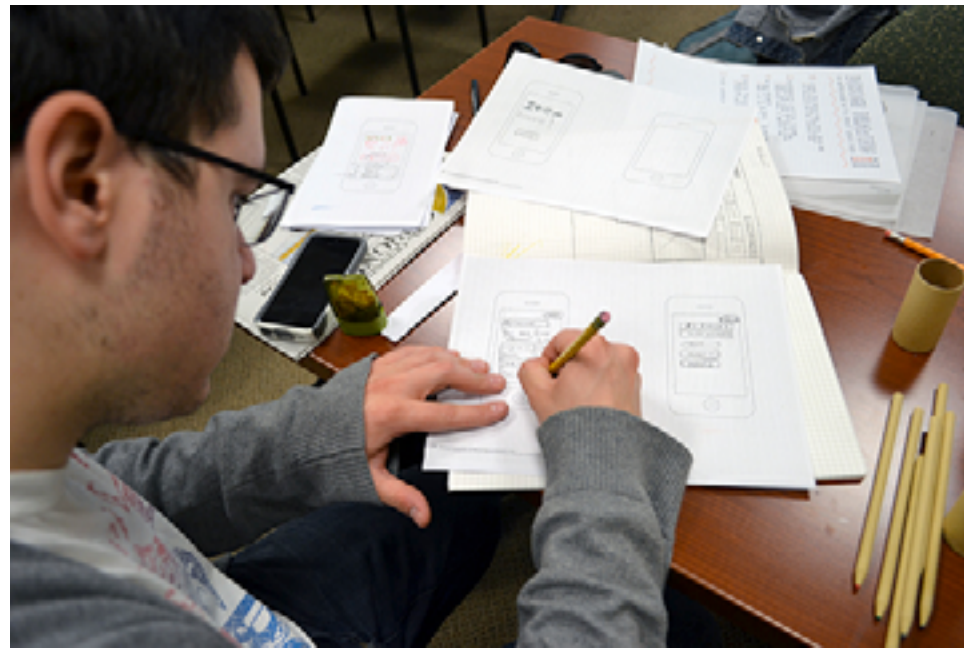
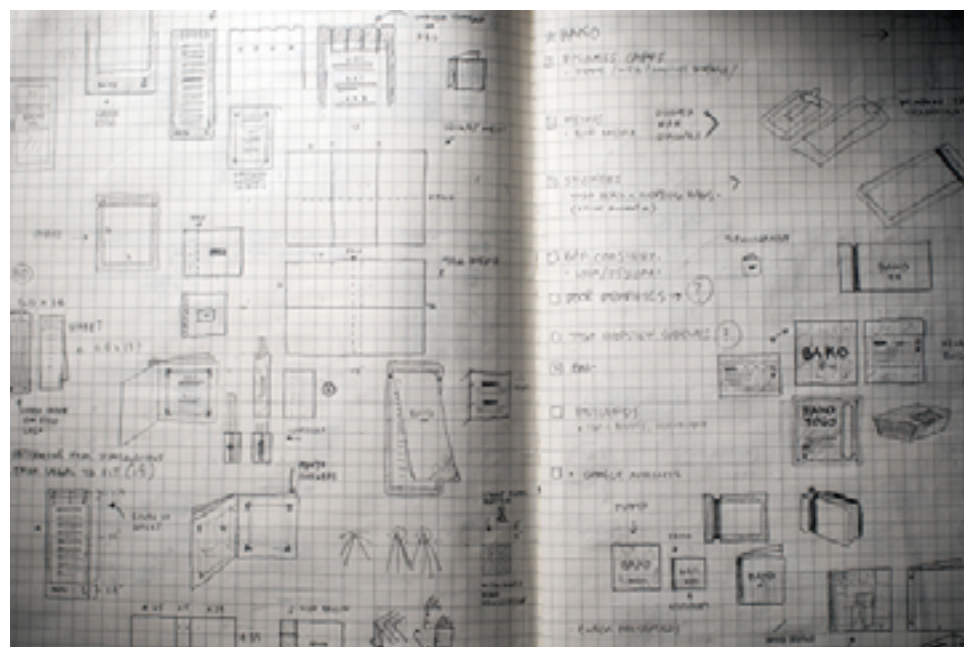


Fig. 4 – Student in design drawing workshop

**What is Design Thinking and what does it have to do with drawing?**

Unfortunately, “Design Thinking” is a baggage-laden term that seems to be hard to define. The following definition, for instance, makes the process seem as dull and lifeless as a

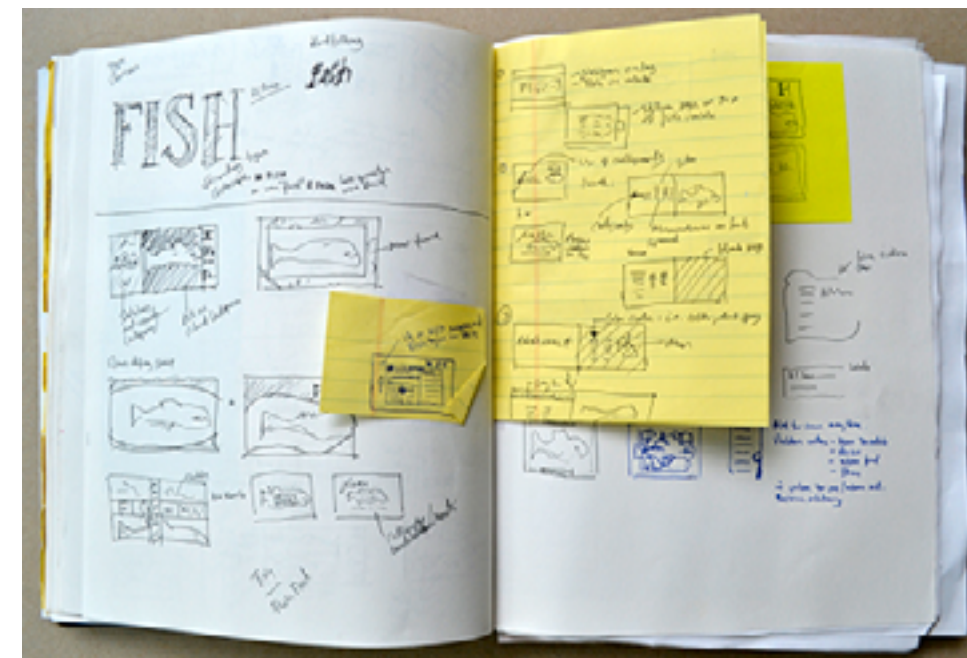
Fig. 5 – Ideation sketches by Geoffrey Smith



corporate board meeting.

“Design thinking is a methodology for practical, creative resolution of problems or issues that looks for an improved future result.” [http://en.wikipedia.org/wiki/Design\\_thinking](http://en.wikipedia.org/wiki/Design_thinking)

The same source also describes it as “the design-specific cognitive activities that designers apply during the process of designing.” That’s not a great deal clearer. It might more easily be understood as a process of steps or practices used to solve design problems of all kinds. This multi-step design process generally includes observation, research, ideation, prototyping, testing, implementation, and review. Design Thinking is a very popular subject these days, the topic of many books and quite worthy of it’s own presentation, but I will be focusing on



one small but important aspect of it for now. Drawing.

The research and ideation phases of the Design Thinking process typically incorporate forms of drawing, which can include thumbnails, sketches, comprehensives, wire frames, storyboards and paper prototypes. Even though the design process sounds linear, it is actually non-linear or cyclical - the research informs the drawing and the drawing informs the research. In this symbiotic relationship, ideation is primary and the quality of the drawing skills may or may not affect the outcome of the process. One might argue that the drawing/thinking aspect of the design process is the most important part. It is from this collection of ideas that a design project moves forward toward implementation.

The basic purposes of design drawing can be summarized as generating, visualizing, documenting, collaborating, and analyzing. I’ve broken this down into three main drawing and thinking practices:



Fig. 6 (left) – Research sketches by Bjørn Akselsen

Fig. 7 (above) – Logo sketches by David Airey

Fig. 8 (below) – Logo sketches by Mike Rohde



1. thinking of and through ideas

This includes visualizing and recording ideas to externalize and convey the process of thinking. The goal for this kind of drawing is for idea generation and exploration. The best approach is to start with deep research and then freeform brainstorming of ideas on paper in which quantity is pursued in order to reach quality. This stage of the process often happens in a sketchbook that is kept for the purpose of generating ideas.



Fig. 8 – Logo sketches by Mike Rohde

2. thinking to improve ideas

Once the flow of ideas begins to form on the page, the processes of analysis, comparison, iteration, elaboration, reflection, and development can begin. Sometimes generation and analysis occurs simultaneously and sometimes it is successive. Reflection on the drawings reveals relationships, strengths and weaknesses that allow for refinement, reduction, and reiteration. In volume, the drawings can create a dialogue between ideas and aid in selection. At this stage, the drawing refinement process involves cleaning up and organizing the ideas in order present or share them with others.

3. thinking about ideas with others

Design drawings are often created for the purpose of collaboration, communication, and conversation. They are used to explain ideas to others and to engage discussion around the

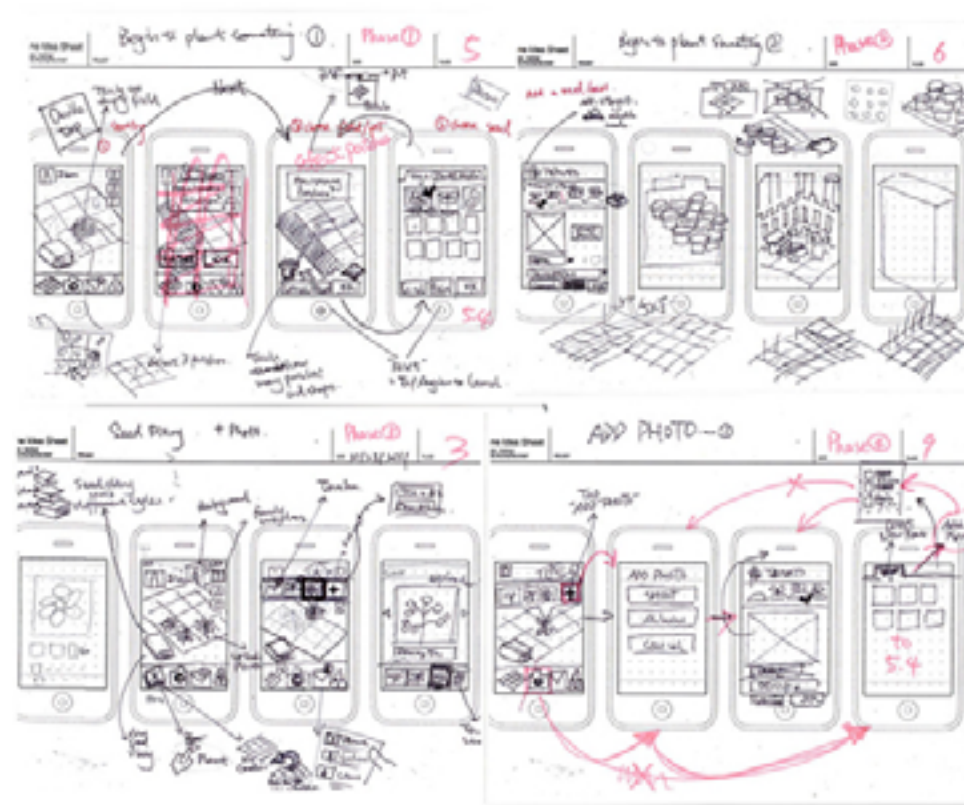


Fig. 9 – Mobile UI drawings by Jo Lamm

project or problem. Through their ephemeral nature, design drawings convey an idea that is in process not completion, which invites reflection, responses, criticisms, and alternatives. At the collaborative stage additional drawing resulting from the conversations is often superimposed on the presented drawings. Depending on the outcome of this collaboration, the designer may return to stage 1 or stage 2 or move forward to the execution of prototypes.

Why do designers draw when they have all those nifty devices at hand?!

Some designers have taken on digital tools as their sketchpad of choice, but most still advocate for pencil and paper as the starting point. The time and energy investment in ideation within software usually far outweighs any benefits that might be had in the early stages of thinking through drawing. It is also common for designers and design students become more attached to their digitally generated sketches. It is often harder to see them as incomplete, or to detach and throw away weaker ideas. It is also harder for collaborators to recognize the unfinished qualities of a computer sketch. The initial ideation “effort” has the risk of jumping to the completion stage, therefore missing critical improvement possibilities in the process.

(Figure 11 overleaf)

Some of the advantages of drawings in the design ideation process:



Fig. 10 – Sketchbook ideation by Bjørn Akselsen

- \_Fast – in the moment, no need to boot up, find a plug, export or output
- \_Abundant – there is no limit to the number of ideas in the initial exploration
- \_Disposable – low risk/low stakes in the ideation process, easy to discard
- \_Generative – focus is on the process and conceptualization
- \_Friendly – looseness and incomplete detail invites collaboration/conversation

Enter the Students: “But I can’t draw! Don’t make me draw!”

While drawing and sketching continue to be critical methods for innovation in professional

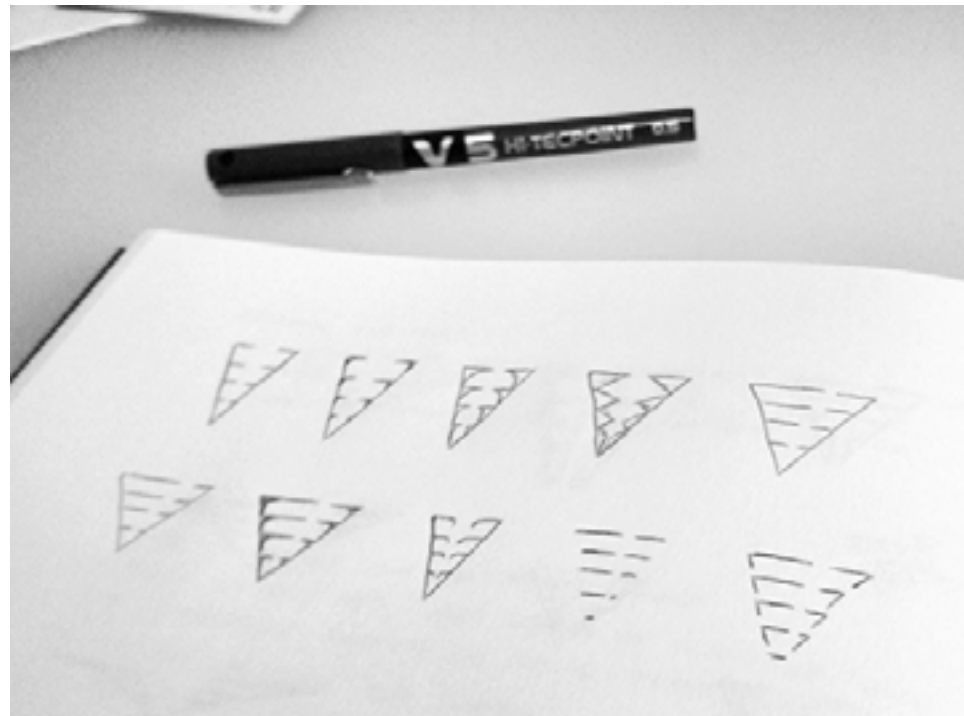


Fig. 11 – Logo sketches by David Airey

design processes, many eighteen-year-olds entering design programs in the US are largely unaware of the importance of pencil and paper. They often view the computer as both the beginning and the end of the design process. They have become accustomed to thinking of and using the machine as a creative problem solver. In my decades of teaching, many of the students I have encountered lament the fact that they cannot draw or sketch and they are resistant to the practice and effort necessary to become proficient. What they don't realize is that the kind of drawing needed for the discipline is quite distinct from what they imagine "drawing" to be. They have grown dependent on computers and devices and dependent on mediating the ideas of others rather than conjuring their own original creations. Learning to draw seems a step backward to them or even archaic. For many students, finding images has superseded creating ideas.

Teaching design technology is like forever rolling the boulder up the hill. The software applications that students learn as Freshmen are obsolete by the time they are Seniors. Couple this fact many desire to only learn the software and it becomes a huge challenge to get them to slow down and use the processes that will make them better thinkers and better designers. Excelling in the world of ideas and creativity is much more challenging than getting up to speed in the latest graphics application. It is far easier to become a technician than to become an innovator.

So, design programs have this crazy balance to try to maintain: teaching appropriate technologies that change every six months and teaching the skills that change very little, such as research, conceptualization, typography, and grid structure, etc. With this precarious balance, how can we get our students to appreciate the unchanging aspects of the design process and slow down in a world that is ever increasing in speed?

Fig. 12 – Mobile UI drawings by Harold Emsheimer



Fig. 13 – Student drawing

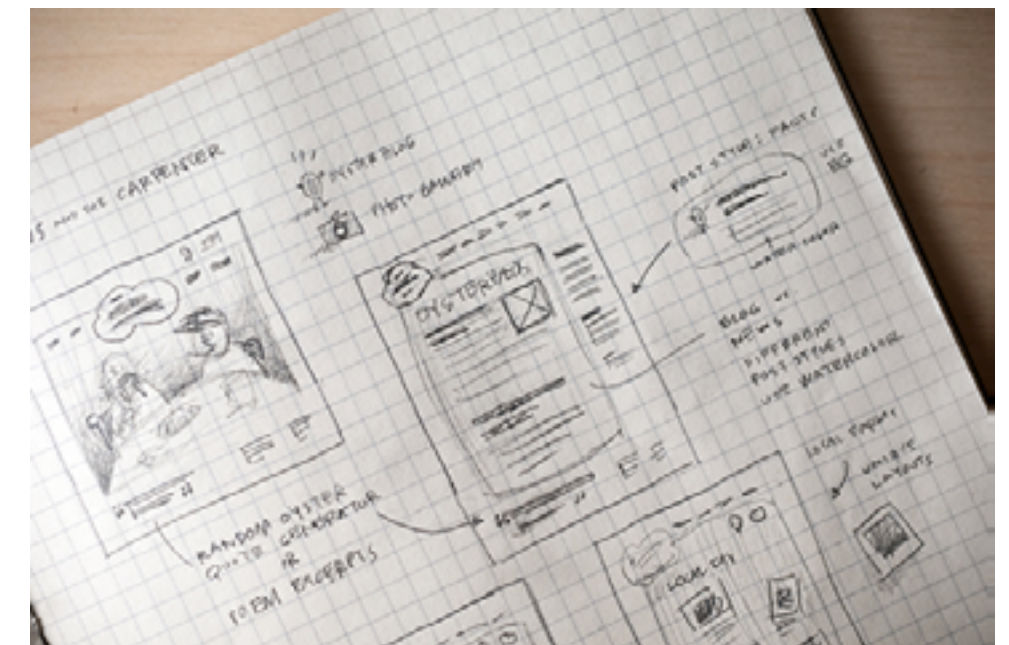


### Drawing in the Discipline

There are a growing number of courses aimed specifically at the kinds of drawing and thinking skills needed for professional design practice. (See Appendix A for examples of catalog descriptions of these courses.) Some design drawing courses are being taught in tandem to graphic design courses. The drawing course utilizes the projects from the design course as the basis for the content and curriculum. This is much like a lab attached to a science course. This model is intriguing in its emphasis on drawing and ideation coupled with the design project curriculum. We have always tried to incorporate aspects of design drawing within our general graphic design curriculum, but the students try to avoid the design process and go straight to the computer. We are now working on creating a sequence of classes or labs that focus on design drawing as the measurable outcome of the course.

What kinds of drawing techniques would best support design students whose focus is on web and mobile UI/UX, identity systems, publications, and motion graphics? This question is actually not too hard to answer. There already exists a visual vocabulary or symbolic shorthand that designers have been using and adding to for many decades. Generations of practicing designers have built rich visual languages for thinking through the design process. This language has largely been added to and passed on from person to person, through bits and pieces. A robust design drawing symbol and method resource would be of huge benefit to educators, practitioners and researchers. In the mean time, what follows are the basic skills and methods we are teaching for design thinking through drawing.

Fig. 14 – Sketchbook page by Geoffrey Smith



**Key concepts and practices for design thinking through drawing:****\_reading design drawings**

Like an architect learns to read plans, designers learn to read the symbols of the discipline in order to create their own ideas or execute the ideas of their colleagues and collaborators. Learning the symbolic language of design drawing includes learning to see grid structure, composition hierarchy, layout, and recognizing font families and color palettes, etc.

**\_research**

Questioning and discovery are the very beginning of the Design Thinking process and precede the approach of pencil to paper. This means looking at the problem or project from all angles and aspects. This stage is often aided by visual research, the creation of mind maps, mood boards, interviews, information searches and all the other methods that good, deep research involves. What does the problem look like? How has the problem been solved by others?

**\_shape**

Lines, rectangles, and circles are the essential underlying forms of design ideas. These basic drawing elements can be composed to create an endless variety of shapes and objects. Gesture and contour drawing aid in the creation of forms and add qualities of looseness and openness that invite discussion. Learning to see and draw negative spaces can support the envisioning of dynamic compositions and ideas.

**\_structure**

Creating the geometries and grids of pages and interfaces is crucial to design ideation. Knowing the standard formats (3x4 grids, resolution, mobile screen dimensions, page size, folds, dies, etc.) and learning to work within them enables designers to envision appropriate solutions when drawing thumbnail and rough layout sketches. Construction lines (guides) and measuring techniques (pixels, inches, centimeters) vary between media and are critical to communicating the practical application of ideas.

**\_type**

Type is almost always a part of the solution for any graphic design problem, so thinking about and indicating type is a primary skill for design drawing. Standard methods exist for indicating type whether it is for grid structure, headlines, body copy, or information hierarchy. Type is also frequently used as image or concept, so the ability to render letterforms that do and do not exist expands the ideation possibilities.

**\_symbol**

Design invariably involves a variety of marks and icons for meaning, metaphor or action within the implementation. This could be a navigation indicator or an organization's logo among many, many other things. This would be the design of symbols for outcome. There



**Fig. 15 – Caption: Student drawing**

are also many useful symbols in the design drawing vocabulary that are used as shorthand in communicating ideas. In this usage, symbols, such as arrows, indicate relationships or actions, rectangles are pages or screens, dotted lines become folds, a box with an X through it indicates image placement, and so on.

**\_dimension**

Form and shading are combined to indicate depth or volume in design sketches. The ability to convey the illusion of three dimensional space or shape upon a two dimensional space (paper or screen) is a highly useful skill. Dimension can easily be learned by drawing the basic shapes of sphere, cone, cylinder and box then transferring that knowledge to more complicated shapes through practice.

All of these basic skills can then be applied to various kinds of design drawing: thumbnails, storyboards, sketches, diagrams, mind maps, flow charts, wireframes, layouts, paper prototypes and functional prototypes, to name a few.

**Some side effects of students drawing**

Once we get the students past the stage of fear and resistance, there are noticeable changes in their performance and practice. This has been my experience in the classroom, though others have written about it in relation to drawing in general. When we manage to get the students engaged in the design drawing process, they begin to experience all sorts of benefits from slowing down and focusing on pencil and paper. In addition to improved ideation skills, they articulate the following experiences directly or express it through their projects

and participation.

**Joy**

They are reintroduced to the pleasure and joy of using their hands to create. I see glimmers of joy on occasion when a student overcomes a sticky technical issue on the computer, but it does not match the pervading peaceful happiness that occurs when they are using their hands to draw. When I run my Sunday afternoon design drawing workshops – they don't want to stop – they want more, they express that they would like to stay into the evening.

**Focus**

Improved attention and focus skills are a natural byproduct of a drawing class. Regular drawing practice creates improvements that spill over into other activities where focus is needed or desired. Also, when they invest in the ideation time at the beginning, they are less likely to slap something out quickly in the prototyping and implementation stages.

**Presence**

Drawing and being together while not mediated or interacting with devices improves engagement and participation. Friendships and collaborative relationships form while unplugged. The ability to sustain attention is improved.

**Flow**

Engaged drawing (even design drawing) can take us into flow states where time suspends, flies by or disappears completely. This is one of the true pleasures of creative practice.

**Failure**

Drawing means making mistakes, erasing, scratching out, revising and redrawing. In a culture where we have been programmed to avoid mistakes and failures at all cost, drawing is a safe place to fail. Failure is actually a critical part of the design process and it is better to “fail” in the earlier stages on paper than in the implementation – there is simply much less at stake.

**Success**

It is actually quite fast and easy to make dramatic improvements in the ability to draw, particularly for design drawing. There's an enormous satisfaction that comes with visible evidence of improved skills. This can happen in a single class and shift a student's entire outlook on drawing.

These intangible side effects are what can keep a student returning to drawing. It might be helpful to make reflection on the act of drawing a part of the classroom practice. Perhaps bringing these aspects of the experience to their attention will reinforce the development of a regular drawing practice.

*Figure 16*



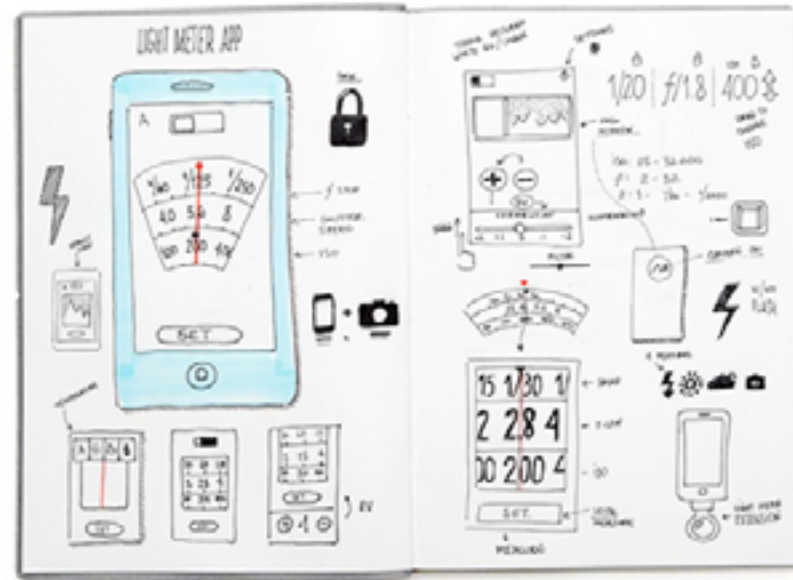
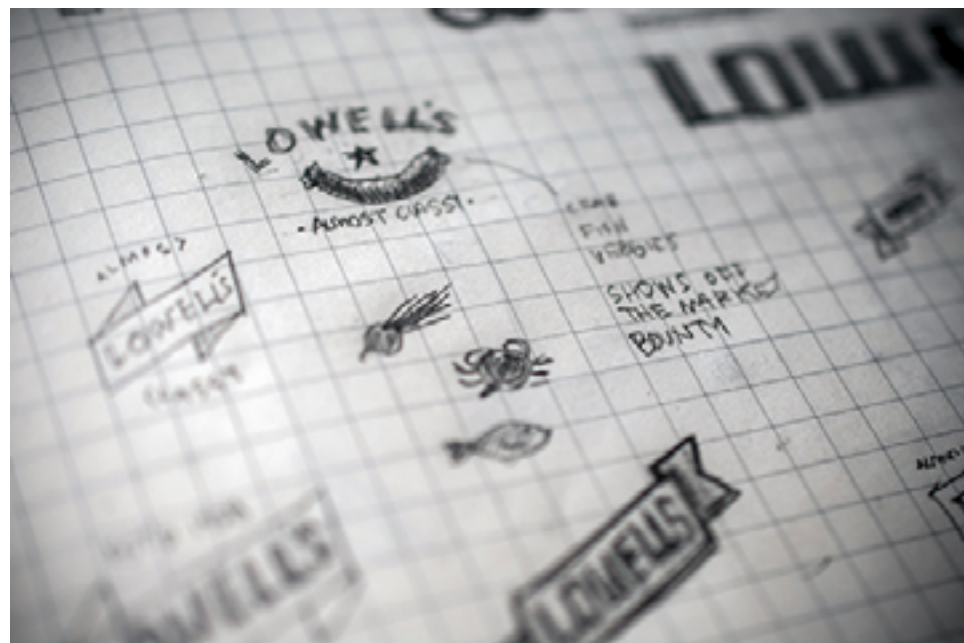


Fig. 16 – Mobile UI by Anton Repponen

Fig. 17 – Logo sketches by Geoffrey Smith



**Where do we go from here?**

The main goals of a design drawing course are to prepare the students for visual problem solving and to foster better student design solutions through the practice of thinking through drawing. This calls for a multilevel approach that incorporates research and ideation along with the targeted drawing practices needed to generate and communicate ideas. In addition, incorporating a reflective aspect into the courses may aid in the embodiment or ownership of design drawing as an important habit to develop. I believe it will take a crowd of voices to inform, restore and nurture the place of drawing in the design process. I am hoping that putting these thoughts out into the world will inspire research, ideas, dialogue, and collaboration around the issues of drawing for Design Thinking.

**Design Drawing Gallery**



Fig. 18 – Mike at Creative Mints, logo sketches

Fig. 19 (top right) – Mike at Creative Mints, logo sketches

Fig. 20 (bottom right) – Mike at Creative Mints, logo sketches





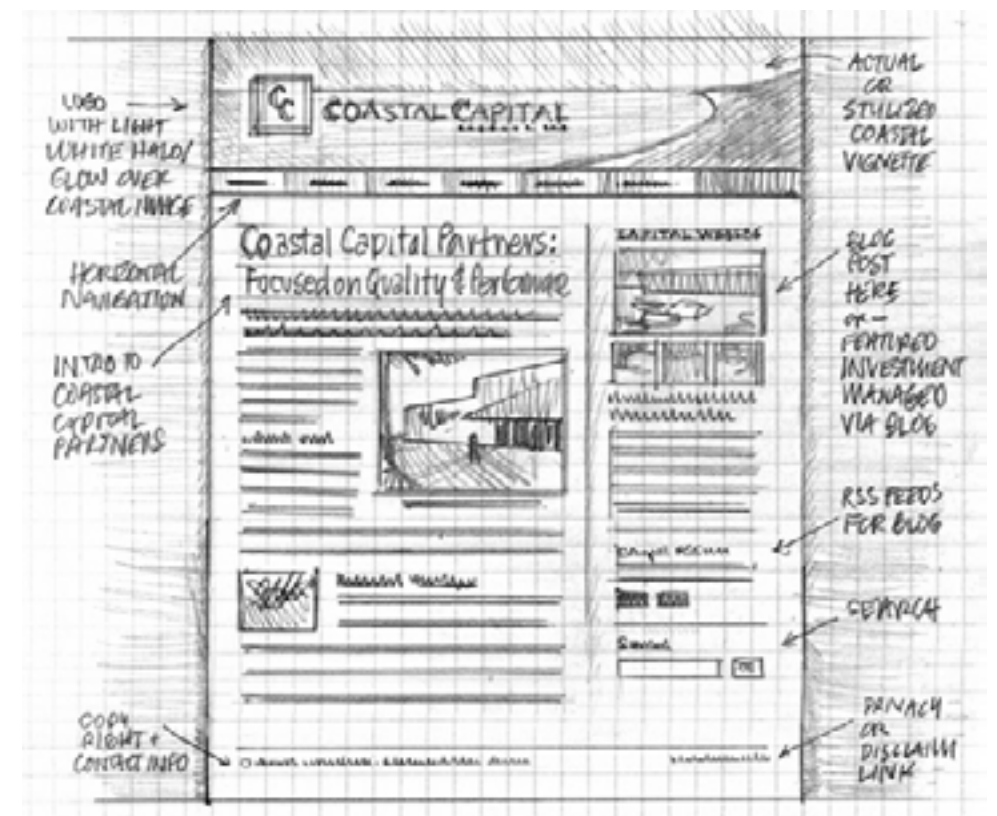
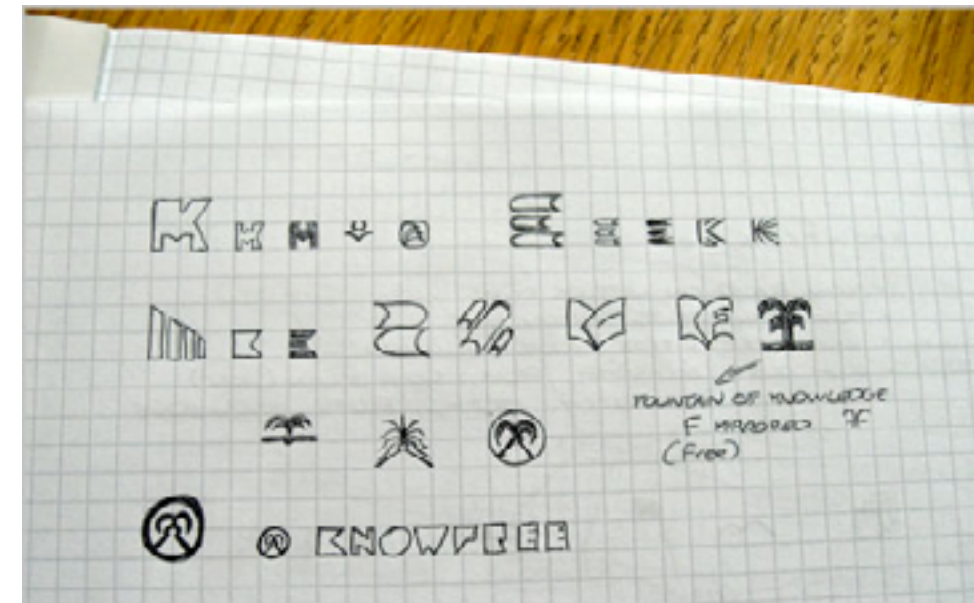
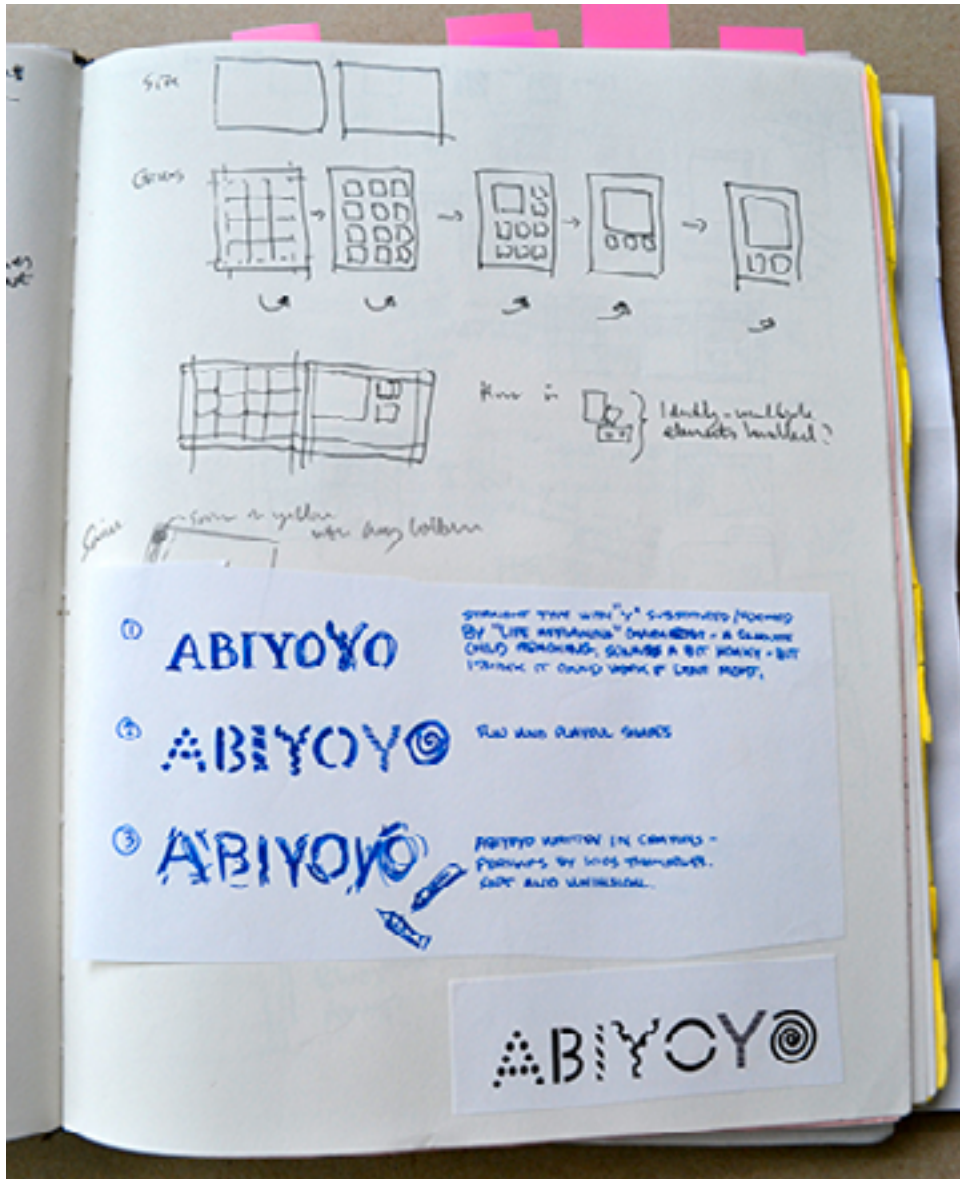
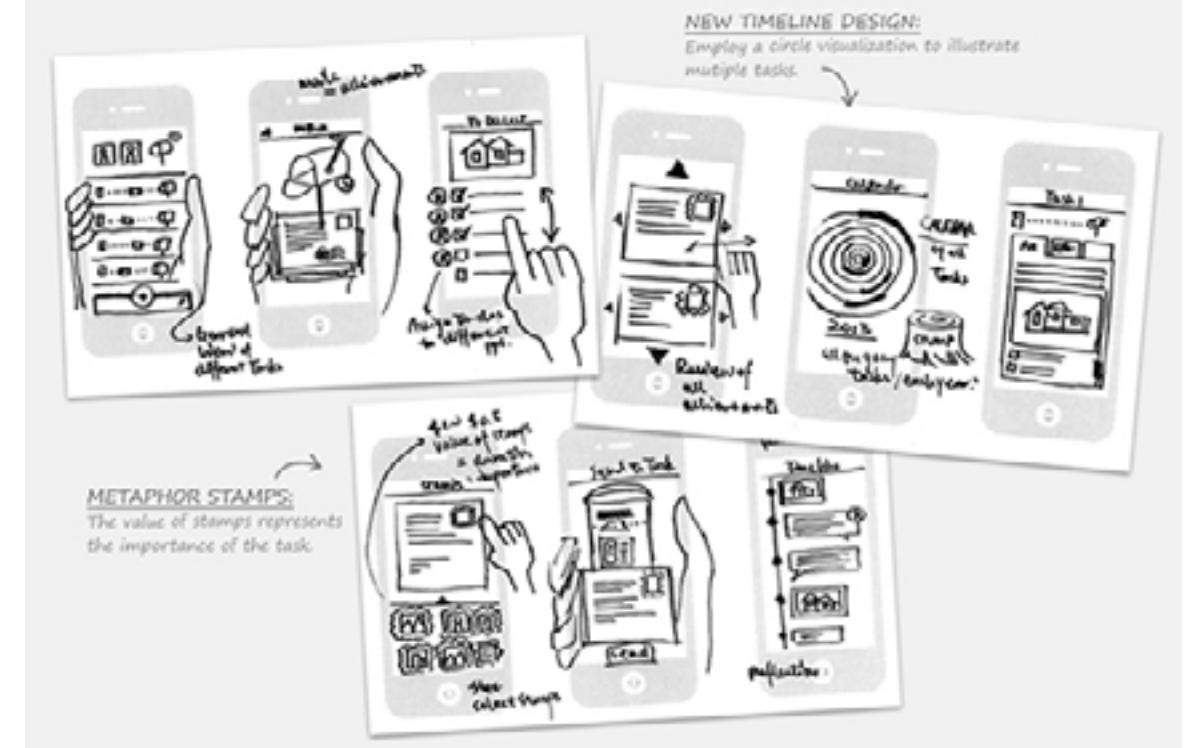
Fig. 21 (top left) – Mike at Creative Mints, logo sketches

Fig. 22 (bottom left) – Bjørn Akselsen, logo sketches

Fig. 23 (below) – David Airey, logo sketches

Fig. 25 (top right) – Jo Lam, mobile UI

Fig. 26 (bottom left) – Mike Rohde, web site sketch



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Mike at Creative Mints, Figures 18, 19, 20, 21

creativemints.com

Anton Repponen, Figure 16

work.repponen.com

Mike Rohde, Figures 3, 8, 26

rohdesign.com

Geoffrey Smith, Figures 1, 5, 14, 17

lookatlao.com

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To explore more examples of Design Drawing:

<http://www.pinterest.com/pattiebelle/design-drawing/>

**Appendix A**

**A SELECTION OF DESIGN DRAWING COURSES**

**University of Kansas, USA**

**BDS 212: Drawing for Design**

This course will focus on drawing as a tool of communication through freehand exercises that explore observation and perception, form and proportion, dimensional illusion and expressive characteristics using a variety of materials and media. Some identified sections of this course will also use two- and three-dimensional modeling software.

<http://www2.ku.edu/~distinction/cgi-bin/vis.-comm.-graphics>

**Durham College, Canada**

**Drawing for Design**

This is a mandatory drawing course to introduce the visualization of ideas. It nurtures the skill required to help one person explain what they imagine to another person. The syllabus will introduce drawing for ideas, or ideation; drawing to challenge and compare ideas, or propositional drawings; and presentation drawings, which give the audience a sophisticated understanding of what the artist has in mind, whether that is an object or an action. This course offers a sequence of accumulated ideas and skills culminating in a finished video narrative.

<http://www.durhamcollege.ca/courses/drawing-for-design>

**Emily Carr University of Art and Design, Canada**

**CECD 160: Drawing for Design**

Drawing is an essential process in design. It is a necessary tool for concept development and is used to communicate with clients and other design professionals throughout the design and production process. This course introduces you to the basic principles of drawing: point, line, form, tone and value, the representation of mass and volume, and composition. Assignments include exercises in drawing techniques and will involve skills required for problem solving and communication; some assignments may be framed as specific design projects.

<http://www.ecuad.ca/programs/courses/CECD/160>

**Eastern Washington University, USA**

**DESN 100: Drawing for Design**

This course covers hand-drawing as a design skill. Emphasis is on sketching, design drawing, design process and composition studies for visual presentation and design solutions. Students gain drawing skills such as basics of drawing techniques, basic shapes, light, texture, pattern, gesture and perspective drawing to communicate and present their ideas visually. Students learn and develop critical thinking and creative problem solving skills using the drawing process.

<http://www.ewu.edu/cshe/programs/design/design-degrees/ba-in-visual-communication-design.xml>

**York University, Canada**

**Drawing for Design**

Develops a visual vocabulary for the representation of objects and ideas for communication in design applications. Ideas and concepts will be explored and translated into literal, abstract and symbolic form for use in graphic representations, pictograms, symbols and letterforms in order to help communicate with impact. Foundation of drawing illustrative matter for commercial applications using various materials and techniques appropriate to the field of graphic design and illustration. Emphasis on visualization and sketching of concepts.

<http://design.yorku.ca/bdes/course-info-second.php>

**Muskegon Community College, Michigan, USA**

**GRD 130 - Drawing for Graphic Design**

Catalog Description: Study and practice of basic graphic design drawing elements such as line, value, texture, composition, one and two-point perspective and color. Students will apply these elements as they develop concepts for graphic design. Tools used include pencil, pen and ink, colored pencils or makers and the computer.

<http://www.muskegoncc.edu/pages/1405.asp>

**Santa Monica College, California, USA**

**GR DES 35: Drawing for Graphic Design**

This studio course is an introduction to quick sketching techniques for graphic design students. Students will develop and practice techniques employed by working graphic artists to quickly create drawings for concept, layout development and communication to clients, photographers, illustrators and associates, utilizing a variety of media, including pen, pencil, and markers.

<http://academy.smc.edu/grdes/courses.html>

**Spokane Falls Community College, Washington, USA**

**GRDSN 105: Drawing for Graphic Designers**

This course is an introduction to drawing fundamentals for graphic designers: hand-eye

coordination, observation techniques, attention to format and proportion, perspective and composition. Students will be introduced to techniques employed by working graphic artists and will strive to create thumbnails and representational drawings for concept and layout development in a timely manner.

<http://graphicdesign.spokanefalls.edu/grdsn105/syllabus.htm>

<http://graphicdesign.spokanefalls.edu/>

## MIT, Boston, USA

### Drawing as Thinking for 2.007

#### *Linking Eye and Hand for Better Design*

#### *Drawing for 2.007 Design and Manufacturing I*

Words are good descriptors. And, CAD programs represent a revolutionary drafting tool. But, drawing and sketching—pencil to paper—is still a first means of developing, problem solving your ideas and designs. The Drawing as Thinking portion of 2.007 is designed to teach freehand drawing skills while fostering the intuition and creativity such skills make available. Students with little or no artistic training will get the chance to effectively output whatever they're able to imagine. A wide range of seeing and drawing exercises will parallel the 2.007 design process to help students move beyond their inhibitions and toward innovative, functional designs. (Lab Module for introductory engineering class)

<http://pergatory.mit.edu/2.007/resources/drawing/Drawing%20as%20Thinking.pdf>

## Appendix B

### *Selected Design Drawing Bibliography*

#### **Books:**

Airey, David. Logo Design Love: A Guide to Creating Iconic Brand Identities. Berkeley, CA: New Riders, 2010. Voices that Matter.

Buxton, William. Sketching User Experiences: Getting the Design Right and the Right Design. Amsterdam; Boston: Elsevier/Morgan Kaufmann, 2007.

Cross, Nigel, and SpringerLink. Designerly Ways of Knowing. Basel: Birkhäuser Basel, 2007.

Dabner, David, et al. Graphic Design School: The Principles and Practices of Graphic Design. 4th ed. Hoboken, N.J.: John Wiley & Sons, 2010.

Greenberg, Saul. Sketching User Experiences: The Workbook. Waltham, Mass.: Morgan Kaufmann, 2012.

Heller, Steven. Inside the Sketchbooks of the World's Great Graphic Designers. NY, NY.: Monacelli Press, 2010.

Heller, Steven. Typography Sketchbooks. NY, NY.: Princeton Architectural Press, 2011.

Lawson, Bryan. What Designers Know. Burlington: Elsevier, 2004.

Nelms, Henning. Thinking with a Pencil. Berkeley, Calif.: Ten Speed Press, 1991.

Samara, Timothy. Drawing for Graphic Design: Understanding Conceptual Principles and Practical Techniques to Create Unique, Effective Design Solutions., 2012.

#### Articles:

Baskinger, M., "Pencils before pixels: a primer in hand-generated sketching," Interactions 15(2), 28-36, ACM Press. March 2008.

#### **Websites:**

Knight, Carolyn and Glaser, Jessica, "Drawing And Mark-Making — The Creative Way To Maximize Design Ideas With Type," Smashing Magazine, Sep. 2012. Web. 10 Oct. 2013.

Marquardt, Nicolai, "Sketching Strategies," nicolaimarquardt.com, 20 Sep. 2009. n.d. Web. 9 Sep. 2013.

Rohde, Mike, "Sketching: the Visual Thinking Power Tool," An A List Apart, 25 Jan. 2011, Web. 10 Oct. 2013. 18 Feb. 2013

# Imperatore | Seeing More-or-Less: Drawing as Disposition of Perception

## Abstract

This paper considers drawing's capacity to articulate from unexpected edges of the visual field. Drawing interprets through layers of vision – shifting regard between the *perceived/percept* and the *imagined/image*. Within ordinary perception, the disposition of sight is oriented towards expectation. It is a visual regime that reinforces “what meets the eye” (or the “I”). The view to drawing allows for reception of *other* perceptions that *un-enforce* to expand or distill – to see *more* or *less* than what meets the eye.

The disposition of perception accessed in drawing is a reconfiguration of vision itself (*in-sight*), and a reconfiguration of thought processes. Drawing can open onto intervals at the peripheries of vision, onto dormant precincts of perception: subtleties of reflection, borders of sleep and dreams, or auras and occlusions that flicker across our gaze and our imagination everyday. The observant draughtsman cultivates the ability to withhold aspects of cognition within perception, therefore purposely refusing to seek conclusion from preconception. In acknowledging glimpses of the ephemeral, drawing reveals a fuller accounting of embodied life. The success of a drawing's communication depends not on faithful construction of external reality, but on whether it chronicles the draughtsman's journey into some *other* moments of perception.

## Biographical details

Lynn Imperatore began to draw before any doubt registered regarding this curious facility. Early mastery, instigated by a combination of short-sightedness and migraine-related visual disturbance, presented drawing as essential means for mapping the perceptual. Her work focuses on interplays between drawing, imagination, and input from the peripheries of the vision. She is currently engaged in a practice-led PhD at UWE/Bristol, UK, titled: *Out of the Corner of the Eye (the 'I'): A practice-led inquiry into imagination at the peripheries of attention*

– that examines drawing in its capacity to articulate the unexpected edges of the visible.

Lynn attended School of the Museum of Fine Arts in Boston, and received a BA from New York University and an MFA in Visual Art from Vermont College of Fine Arts. She taught in university, post-graduate and adult education in the United States (before relocating to the UK in 2008), and has exhibited widely in the US, as well as in the UK and Europe.

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- Contact: lynnimp@gmail.com

## Preface

### Interweavings: Pedagogy, Methodology and Research

Image-making begins with interrogating appearances and making marks. Every artist discovers that drawing – when it is an urgent activity – is a two-way process. To draw is not only to measure and put down, it is also to receive...like burrowing in the dark, a burrowing under the apparent. Sometimes the dialogue is swift... it is like something thrown and caught.<sup>1</sup> (Berger, 1992: 131)

There is a case to be made in support of practice-based visual art doctoral research – and key advantages for embracing practice-led – that is, *practitioner-led* – visual art research into and through *drawing*. The primary reason is that the artist-as-researcher can articulate and illuminate understandings of the process from the *inside-out*, in ways that theorists and art historians cannot necessarily access. Such research benefits in its being the maker's account. Hence, I begin with writer-practitioner John Berger's astute *inside-out* observation on the dynamics of drawing. Additionally, the particular directness of the medium of drawing positions its potential as common and vital cognitive tool, one whose findings may be applicable across a number of disciplines.

In considering the modes of drawing engagement as outlined in this year's DRN conference brief for *Interweavings: Pedagogy, Methodol-*

<sup>1</sup> Berger, J. (1992) 'A professional secret', *Keeping a Rendezvous*. New York: Vintage. p. 131

*ogy and Research*', these paper seeks to address the specific concerns of the call in the following ways:

- *Methods adapted from drawing applicable to education:* Drawing as discrete perceptual disposition that allows for more concise and deliberate views onto the visual field.
- *Teaching and learning of drawing as inspiration for research:* Areas of interest include – cognitive states accessed within the act of drawing – and how such interventions upon the visible – i.e., the *drawing-as-artefact* – remain as record of this cognition.
- *The activity of drawing as a form of research in itself:*
  - a. Again, the artist-as-researcher can address understandings of the process from the *inside-out* – in ways that academic theorists (*outside-in*) may not.
  - b. As a *particular* method of practice, transcriptions of image from image (i.e., 'copying' from other visual works) can bring about conversations across time, in a mode of dialogue that is wholly contained within the visible.

## Introduction

### Part I: Seeing More-or-Less

My research has focused on *drawing's* capacity to translate and record aspects of the *interior experience* of seeing – specifically, how *drawing* can grasp and recount something of perception that is over and above the nominal subject-matter reproduced and/or immediately apparent on surface of the drawing. *What else might be discerned and brought into the visible - within both the process and the enduring artefact of the drawing?* There are subtle and transient emanations that unfold alongside the more dominant perceptual input of waking visual life. These can take form in our dreams, imaginations, reveries. When we see, we are selective and, in doing so, we overlook. There is *always* more available to perception than can be extracted the flash of the temporal moment. *Drawing* adjusts, even slows, the process of looking so as to receive the subtle views and revelations of *imaginative life* into exterior description.

My project began with a specific attention on using *drawing* to explore sleeping and dreaming life.

I am not concerned with psychological analyses of dream content.

Instead, I am curious about the mechanisms of image generation, in whether and how such generative processes in drawing may correspond to those in dreaming. Even ephemeral states, like sleep itself – a mysterious yet ordinary event of embodied life – might correspond to potent intervals that echo beyond literal depictions within fabricated worlds like drawing.

The scope of my *practice-as-research* has since broadened to consider how drawing addresses other manifestations of *sight* that are not transmitted to the visual cortex through retinal impression. These can include aura, occlusion and other organic hallucinatory input, as well as traces of visual memory – what philosopher Paul Crowther identifies as the ‘spatio-temporal elsewhere’<sup>2</sup> of imagination (Crowther, 2013: 15) – that edge over into consciousness from beyond the temporal frontier. *Unseen/barely seen* phenomena may become discernible within drawing – both in the activity and as a resultant trace. It is, in fact, from my own initial and continual awareness of such extra-visual factors that drives both my practice and my research – as said factors only surfaced into awareness through *drawing*.

*Part II: Out of the Corner of the Eye (“I”)*

In drawing, we assume an altered disposition of our vision, which then distills or expands some area of attention that we, as draughtsmen, have selected out of an overflow of available data within the *visual field*. We suspend cognition of what we *thought* we knew – we take the sensory data of vision apart then put it back together – but differently, re-imagined and reinvented. The process of drawing reshapes our grasp on *the visible*. It is a sensibility that is not any *extrasensory* mode of perception – but rather a strategic shifting of the posture of seeing which can, in turn, discern subtleties and possibilities located inside the perceptible sweep of the everyday. In ordinary perception, we adopt an orientation of sight as function; a visual regime that reinforces “what meets the eye” (or the “I”). The view of drawing accesses and seizes upon *other* currents of input. Even when drawing results in highly skilled renderings of objective topics – it will also simultaneously disclose perceptions that deviate from or surpass the nominal subject-matter of its surface. Even when meticulously considered and rendered – a drawing is a fabrication, an internally invented world not unlike the *dream* – fanciful, incomplete, *other* than mere straightforward depiction

<sup>2</sup> Crowther, P. (2013). ‘Imagination, language, and the perceptual world: A post-analytic phenomenology.’ *Continental Philosophy Review*, Vol. 46, Issue 1, April 2013. p. 15.

the externally seen. Drawing, both as *process (activity)* and *trace (artefact)* – can apprehend and articulate from unexpected edges and aspects of visual experience. Thus, drawing is a poetic transcription, one that documents not only the *literally visible* but the *imaginally latent* as well. Drawing reaches into and through the layers of *seeing*; beyond the assumptions, habits and expectations that typically direct how we view the world. Inspiration may come in imagination’s flash against the *mind’s eye*, or it may arrive into the *body’s eyes* as stimuli from the external visual field. *Drawing* makes us stop and think about the world we see, and how we see it, in ways we would not otherwise. Thus, *drawing itself* is its own species of perceptual cognition. As John Berger observes, it ‘is like burrowing in the dark, a burrowing under the apparent.’ (Berger, 1992: 131)<sup>3</sup>

**Theory**

*Part I: On the Nature Image-making & Vision*

Anthropologist David Lewis-Williams (The Mind in the Cave) constructs a plausible account for the origins of image-making and art. He applies findings of cognitive psychology to consider how human perception positions along a spectrum of consciousness – noting our daily shifts in awareness along a continuum between wide-awake and dreaming. Citing this model, he offers an origin story for image-making that commences as modern human beings first appeared during the Upper Paleolithic transition. These emergent humans were (and are) just like us; save for having less or different information. Lewis-Williams proposes that image-making (cave drawings) began as response to interior vision, that is, as response to visual impressions that present themselves as normal alterations of consciousness within the individual nervous system. Such perceptual alterations are common still. Sometimes, we see things that do not reach the visual cortex through the retina. We rub our eyes and see patterns; some of us experience migraine aura. Still other times vision confounds interpretation, as in discrepancies between perception and explanation when confronted with optical illusions. And perhaps the most persistent differential within visual experience occurs in sleep states: in dreaming and hypnogogia. Lewis-Williams suggests that these initial expressive gestures were nothing more or less than a need to fix fleeting internal imagery externally, so that the maker could contemplate such visions beyond the brief moment of altering perception. In doing so, they shared their visions with others. That these public images were collectively legible indicates the universality

<sup>3</sup> Berger, J. (1992). ‘A professional secret’. p. 131.

of such visualizations.

Lewis-Williams addresses conditions of sight that transpire along the continuum of ordinary visual consciousness. Philosopher Colin McGinn (Mindsight: Image, Dream, Meaning, 2004) explores the nature of our visual faculty, in particular, where and how visual imagination and imagery are understood in relationship to our primary notion of seeing – that is, perceptual inputs received by the body’s eyes from an external physical world. McGinn defines and divides visual experience into two broad classifications – percept and image – as both are manifestations contained within what we commonly consider vision or seeing. Percept and image differ primarily in means of discernment – in whether such sights come to us as products of the body’s eyes or the mind’s eye. A simple criterion determines one from the other: percepts are impacted and altered by the body’s movement and proximity, while images are not connected to bodily orientation and will evaporate once we are distracted by further sensory demands. The objective form of a percept, on the other hand, will remain in the world and available for future perception whether we direct our eyes toward it or not.

Something in drawing would seem to exist between these two categories, and thus, it could be suggested that drawing constitutes its own genus of cognition. Drawing is a means for recording layers of visual experience as detected from the interior perspective. It is receptive to the data of *percept* and *image* alike, capable of fashioning percept into *image*, or *image* into *percept* (i.e., *drawing* as artefact), and so on. Therefore, in our responses to a drawing as viewers, we acknowledge a connection to our shared condition of *interiority*, a condition central to our identity as human individuals.

*Part II: Drawing the Imaginal*

The drawing process can open our eyes – and other senses – and fix into pictorial record more fleeting, subtle and ephemeral sensory data of perception. McGinn and Lewis-Williams provide context for my proposition about imagery at and from the peripheries of attention, and such contexts help explain how I came to *drawing* through one such perceptual anomaly.

In early childhood, I had the ability to view an object before me – then cast the product of my perception onto blank paper, like a projector. I’d grab a pencil and trace my projection, even as it faded from the page. To continue drawing, I’d just repeat the process: look, project, draw. An innocent pastime I believed it to be normal, but I soon learned otherwise. By age eight I needed eyeglasses; by then this trick of the eyes

had faded as well. Yet it imbued in me a passion for feverishly mapping apparitions of vision, a passion for drawing. Later, I understood this visual anomaly as *palinopsia* or after-image manifestation of migraine aura; only in adulthood would I know the accompanying headache. Thus, I acquired drawing as an extension of vision, as knowing rather than learning. Following the strands of practice and interest in my current research, I still circle back to that initial embodied intertwining of *drawing* and *vision*. Even when unaware, my drawing practice has been directed by a remote event of perceptual curiosity that first led me to pick up a pencil and converse with myself about what I saw through drawing.

Hence, the anomalous margins *within* ordinary revelations of sight remain central to my practice and research. What began as a project relating drawing to sleeping/dreaming life now extends to regard how drawing is its own species of altering state or space along the continuum of perception. I would even suggest that choices of the peripheral or unseen as subject-matter can serve to *amplify* perceptual sensitivities, and that drawing *process* can act as gateway to the *imaginal*. This term ‘imaginal’ (found in the writings of James Hillman and Henry Corbin) is useful for reclaiming and re-defining the importance of *imaginative life* - distinguishing it from pejorative misinterpretations that cast *imaginary/imagery* as mere child’s play, or as false reports from outside of true experiences. The *imaginal* is a sensory zone where our images invent and reveal themselves. It is a bona fide occurrence in our experience – just one that is best evaluated by measures other than those of physical authentication.

Philip Rawson (*Drawing*, 1969) wrote that ‘drawing is the most fundamentally spiritual – i.e., completely subjective – of all visual artistic activities.’ While painting and sculpture may mimic appearances deceptively close to how we receive objective sense data - within the field of every day sight we will not readily encounter ‘lines, and the relationships between the lines, which are the raw materials of drawing. For a drawing’s basic ingredients are strokes or marks which have a symbolic relationship with experience, not a direct overall similarity with anything real’. (Rawson: 1969:1)<sup>4</sup> While the *imaginal* can be voiced into various creative expressions, often artists will turn to drawing to tease the first subtle impression of vision into a clearer view. Drawing is tactile and intimate - whether realized in sketch, gesture, preparatory reverie, or the accrued marks and strokes of more developed renderings. Gaston Bachelard remarks that ‘(t)his awareness of the hand at work...

<sup>4</sup> Rawson, P. (1969) *Drawing: The Appreciation of the Arts*. London: Oxford University Press. 1.

alive within us...conveys *images that waken*. It is not the eye alone that follows the lines...for added to the visual image is the manual image that truly wakens the active element in us.’<sup>5</sup> (Bachelard, 1971: 57)

### Part III: Philosophy of Drawing and Images

#### Wollheim

If there are recording angels, they cannot record through drawing. Ethereal creatures, they find the co-ordination of hand and eye too effortless to wring from its objects that we might evaluate as truly interesting.<sup>6</sup>

(Wollheim, 1998:10)

When Richard Wollheim asked his *question-as-title* “What Makes Drawing Interesting?” at Loughborough University in 1998 – he began his talk by noting shortcomings of traditional aesthetics – with its too narrow purview of *truth* and *beauty*. Wollheim credited more recent schools of thought with understanding the weaknesses of such analysis – but then found the modernist canon wanting for its own reductive tendencies that prefer to limit the reading of images as *texts* and/or *signs* alone – or that privilege the *formal* while neglecting the *meaningful*. Wollheim sought to examine what might be of interest about *drawing* in and of itself – as distinct from concerns of interest regarding the drawing’s ostensibly portrayed subject.

#### Crowther

(T)he artist is not translating a ready-made thought but rather adding to it. In the process of creation we find hoverings, reworkings, estimations...The work-in-progress takes its stylistic clue from perception and extends it until the qualitative configuration of marks or words or whatever announce that the perception is complete.<sup>7</sup> (Crowther, 1982: 142)

Philosopher Paul Crowther builds on Wollheim’s legacy by asserting criteria that locates the evaluation of drawing beyond more conventional stances of art appreciation as well. His criterion is a viewing posture that is based upon *empathy* – a sense of shared communal affective recognition as a precursor for approaching and engaging the kind of

<sup>5</sup> Bachelard, G. (1971) ‘Hand vs. matter’ from *The Right to Dream*. Translated from French by J.A. Underwood. New York: Viking Press. p. 57.

<sup>6</sup> Wollheim, R. (2005) ‘Why is drawing interesting?’ *British Journal of Aesthetics*, Vol. 45, No. 1, Jan 2005. p.10

<sup>7</sup> Crowther, P. (1982) ‘Merleau-Ponty: Perception into art’, *British Journal of Aesthetics*, Vol. 22, No. 2, p. 142.

interest that Wollheim championed. Crowther goes on to propose, a requisite attitude of ‘*disinterestedness*’<sup>8</sup> – but this *disinterestedness* is to not be confused or equated with *uninteresting*. Crowther is formulating a spare and succinct description of the disposition of looking – as application of seeing essential to the perception that facilitates the process of drawing. *Disinterestedness* is also the perceptual motive (or perhaps *non-motive*) we bring to the viewing of works of art. Crowther’s notion of *disinterestedness* addresses a kind of perceptual openness to the possibilities that might arise in perception, when the application of our eyes is not prompted or driven by demands of functionality or other attentional strategies questing for utilitarian outcome. *What do we want when we are looking – and how does that change in the face of art – particularly in the direct expressions of drawing?* Crowther explores a fundamental difference that distinguishes what he calls ‘*picturing*’<sup>9</sup> (Crowther, 2009: 66-70) from our normal visual applications. Normal vision scans – while ‘*picturing*’ fixes. In order to make a visual transcription – to draw from materials of reality – the orientation of perception requires a sustained attention to aspects of the concrete within space. Normal perception will receive or anticipate a world ‘governed by physical laws.’<sup>10</sup> (Crowther, 2008:180) The expectation and anticipation constricted by those ‘physical laws’ (Crowther, 2008) may relegate the subtle and ambiguous within the *visible* to the status of overlooked. Within its extended looking and its altered disposition of sight, ‘*picturing*’ provides conditions under which both maker and viewer can apprehend more fleeting perceptual data.

*In Phenomenology of Visual Art (even the frame)* (2009), Crowther further regards the activities and artefacts of visual art as having significance precisely because they isolate, highlight and fix into the visible something intrinsically meaningful in relation to how we sense the world and how we experience our place within the public sphere. This sphere is called ‘public’ in that it contrasts and acknowledges that its collectivity is comprised of interior and imaginative individuals as its component parts. This shared interiority is integral to how we understand being *human*. The *intrinsic significance* of art may be “based on a convention...whereby resemblance...is the basic referential function without being a significant condition of it.”<sup>11</sup> Crowther sees the endeavour to record or enact such images as an intervention

<sup>8</sup> Crowther, P. (2009) *Phenomenology of Visual Art (even the frame)*. Stanford, CA: Stanford University Press. p. 41.

<sup>9</sup> Crowther, P. (2009) *Phenomenology of Visual Art (even the frame)*, 66-70.

<sup>10</sup> Crowther, P. (2008) “Pictorial space and the possibility of art”, *British Journal of Aesthetics*, Vol. 48, No 2, p. 180

<sup>11</sup> Crowther, P. (2009) *Phenomenology of Visual Art (even the frame)*. p .9

upon the visible/visual that ‘changes one’s cognitive relationship to both the represented object and to oneself, and to existence in more general terms’<sup>12</sup> as we ‘reconfigure physical material so as to represent a state of affairs other than the material itself.’<sup>13</sup> (Crowther, 2009) This in itself sets up the conditions for dynamic depiction that allows for expression of something beyond mere replication of the obviously or directly visible.

### Praxis: Part I

#### Drawing Auras

(T)here are some occasions when perception encounters a meaning or meanings which cannot be grasped immediately -- the aura of ‘something still to be said’ lingers and becomes unbearable. We feel the need to preserve...or articulate further. Here, of course, is the take-off point for artistic creation... (T)he artist’s vision picks out those deviations from perceptual norms (or the possibility thereof) which can find a fuller articulation in his work.<sup>14</sup>

(Crowther, 2009: 9)

I include certain tangible manifestations of visual anomaly from my own practice to demonstrate instances within drawing where the subtleties of perception and idiosyncrasies of vision are acknowledged and captured. These, in turn, corroborate a research claim that drawing practice attends to a broader province of the *visible*. There is an additional aura or anomaly that has come to awareness and expression in my drawing, that can further illustrate this point. It is another migraine aura condition called *visual snow*, which presents as persistent television-like static - appearing as a thickening in the very atmosphere of my visual field. This snow is there in all my conscious vision, even behind closed eyes, and is most pronounced against darkened conditions. Curiously, the only visual situation where I do not experience such occlusion is within the *perceptions* of dreaming.

Thus, without being initially conscious as to why I did this, I developed a correspondent habit within drawing. First, I would meticulously render a subject/object - then feel compelled to disrupt and disturb the careful surface - by applying water to create



Fig. 1-Water Dream

Fig. 2 & 3 Overleaf

an aquatint-like pixilation, or by dripping/washing ink over the drawing. Only recently did I come to understand this as impulse to externalize a peculiarity of vision, to bring drawing closer to an accurate portrayal of the world as I *actually* see it. I also now understand that any attempt to draw from observation requires that I project my gaze through and beyond the occlusive spectre which inhabits my sense of sight. This explains why purely representational drawing was never satisfactory, as it is *not* reflective of the visual as I live it. I feel compelled to add the other emanations of perception back in. As in Lewis-Williams’ account, resolution comes in my capacity to fix a fleeting impression of my vision externally, then to contemplate and acknowledge anew.

#### Palinopsia redux

In the experience of such space, we can explore another person’s selective interpretation of the visible. This centres on a vision created at a publically accessible level, and which is liberated from the vicissitudes of time.<sup>15</sup> (Crowther, 2008: 192) (See Fig. 4, Two pages ahead)

At a gathering of practitioners and researchers last year, I found myself in an intimate dark-lit space to view a performance by one of the artists. The movements of the silent performer were slow, deliberate, attenuated - to the degree that tighter grips of time and physical space seemed to alter. In the quieting slowness, my vision altered too, into something like the character of seeing assumed while drawing. This mode requisite for *seeing-into-drawing*, as identified by Anton Ehrenzweig (*The Hidden Order of Art*, 1967), is ‘essentially ‘polyphonic’... several superimposed strands at once... creativity requires a diffuse, scattered kind of attention that contradicts our normal logical habits.’ (Ehrenzweig, 1967: xii)<sup>16</sup>

I would have *drawn* then, but had neither tool nor paper at hand. Instead, what transpired was an ephemeral mode of drawing that hovered in my field of vision, as apparitions of after-image emerged before my eyes. The performer’s form disclosed as multiples - each body position lingering in the space as a trace of light or halo - not as internal imaginings, but as an externally received and perceived impression.

12 Crowther, P. (2009) *Phenomenology of Visual Art (even the frame)*. p. 18

13 Crowther, P. (2009) *Phenomenology of Visual Art (even the frame)*. p. 26

14 Crowther, P. (1982), ‘Merleau-Ponty: Perception into art’, *British Journal of Aesthetics*, Vol 22, No 2, p. 141.

15 Crowther, P. (2008) ‘Pictorial space and the possibility of art’, *British Journal of Aesthetics*, Vol.48, No 2, p. 192.

16 Ehrenzweig, A. (1967) *The Hidden Order of Art: A study in the Psychology of Artist Imagination*. Berkeley & Los Angeles: University of California Press. p. xii.



*Fig. 2-Vigil (below)*

*Fig. 3-Sleeping/Around (right)*



Fig. 4-Palinopsia Redux



**Praxis: Part II****Seeing Doubled**

The unconscious symbolism of the art form calls forth a reaction...on a far grander scale than the secondary dream elaboration, as though the masterpiece had been a dream of the artist which we, the public, perceive with our waking imagination.<sup>17</sup> (Ehrenzweig, 1965:50)

There is residual force, imbued by the original activity of its making' that endures in the affectively realized artwork. It exists beyond the temporal moment or surface rationalities of what the work ostensibly depicts. This residual force is why we visit museums; it is why we invent our art histories. Within the not-uncommon artistic pastime of sketching at museums and exhibitions, in transcribing the face-to-face encounter with past masterworks, such image-to-image engagements give voice again (and again) to expressive energies that resound across fields of *proximity* and *time*. When these exchanges are entered by drawing, we honour the 'ferocious and inarticulated dialogue... like something thrown and caught,'<sup>18</sup> in Berger's description (1992:131)

I visited Florence and Siena last year. I returned with sketchbooks filled with my gestural responses to the vivid depths and dynamics alive still in masterworks, including records of a rather manic seven-hour session of looking and drawing at the Uffizi. With pencil in hand, odd and isolated moments and movements had exerted their curious pull upon my attention, insisting upon further investigation through drawing: a lone vivid figure in the compositional crowd, the backside of an altarpiece panel, or some element of a design configuration which compelled or conveyed narratives of the improbable and the miraculous.

Indeed, the artist's trace-gestures can inhere...for as long as the work endures – and this of course can be far beyond the creator's lifetime.<sup>19</sup> (Crowther, 2009: 83)

Upon returning home, I came across some forgotten sketch journals, with drawings from a prior visit to these same sites in 2006. I was fascinated to find that, years earlier, my eye and hand had responded not only to the *same works* but *even* to the same specific isolated, particular, and peculiar details as I drew on the recent trip. While I assume that someone else, with pencil and pad in hand, might *listen* to these works differently and grasp at other details, this discovery leads me to specu-

17 Ehrenzweig, A. (1965) *The Psychoanalysis of Artistic Vision and Hearing: An Introduction to a Theory of Unconscious Perception*. New York: Geo. Braziller. p. 50.

18 <sup>13</sup> Berger, J. (1992) 'A professional secret'. p. 131.

19 Crowther, P. (2009) *Phenomenology of Visual Art (even the frame)*. p. 83.

late that the drawing process can animate and amplify an encounter with other embodied expressions into a doubling of the imaginative. There is a latent power - beyond the surface and subject – that whispers across centuries through perceptual resonances that are not immediately apparent in the surface design. After this discovery, I attempted to develop drawings from reproductions of these same selected works, but the drawings (along with my interest) died on the page. The reproductions lack the potency that inhabits the original expressions – and it was those emanations of proximity that evoked my further and fervid *imaginal* response. (Fig. 5, & 7, 8, 9, 10 on the following pages)

In the presence of such masterworks we apprehend a certain quality not readily detectable in the surface schema; revelation comes from the mechanisms and mysteries of image-generation, rather than from an archaic religious pedagogy. These art-historically revered tableaux fix – and then continually re-fix - fleeting pictorial imaginings of what, in fact, were likely never known in literal event. My reverence is for what is conveyed, imagined, and re-imagined in the presence and pursuit of fashioning the *work* of art. When such vision is transposed into active expression – into a *drawing* or *painting* to observe the *unobservable* – then it can enter the realm of the *seen*. Rather than reading these as merely devotions to religious mythology, such endeavours voice devotion to a shared *imaginal life*, as revealed in graphic inventions that commune and communicate with us still.

**Seeing Doubled: Paula Rego**

Paula Rego has been making images out of stories since she was a child... stories... not reproduced from life as observed or remembered, but goings-on in the *camera lucida* of the mind's eye.<sup>20</sup> (Warner, 2003:Tate, Issue 8)

Much has been noted in recent years regarding Paula Rego's thematic threads, and analyses of meaning and politics within her graphic storytelling. The architecture of her expression – a prodigious output of drawing, print, pastel - is constructed from the markings of the drawing hand seeking its fulfillment in a figurative observational approach. What I want to emphasize *here* is an aspect of her creative strategy to that end - how she will first makes three-dimensional fantasy facsimiles, but only as an intermediate step toward her ultimate imaginal goal. That goal is only attained and resolved in the expressive marks of drawing as

20 Warner, M. (2003) 'An artist's dream world' *Tate Magazine*, Issue 8. Available from: <http://www.tate.org.uk/context-comment/articles/an-artists-dream-world-paula-rego> (Accessed 21 March, 2013).

Fig. 5-Lippi 2006

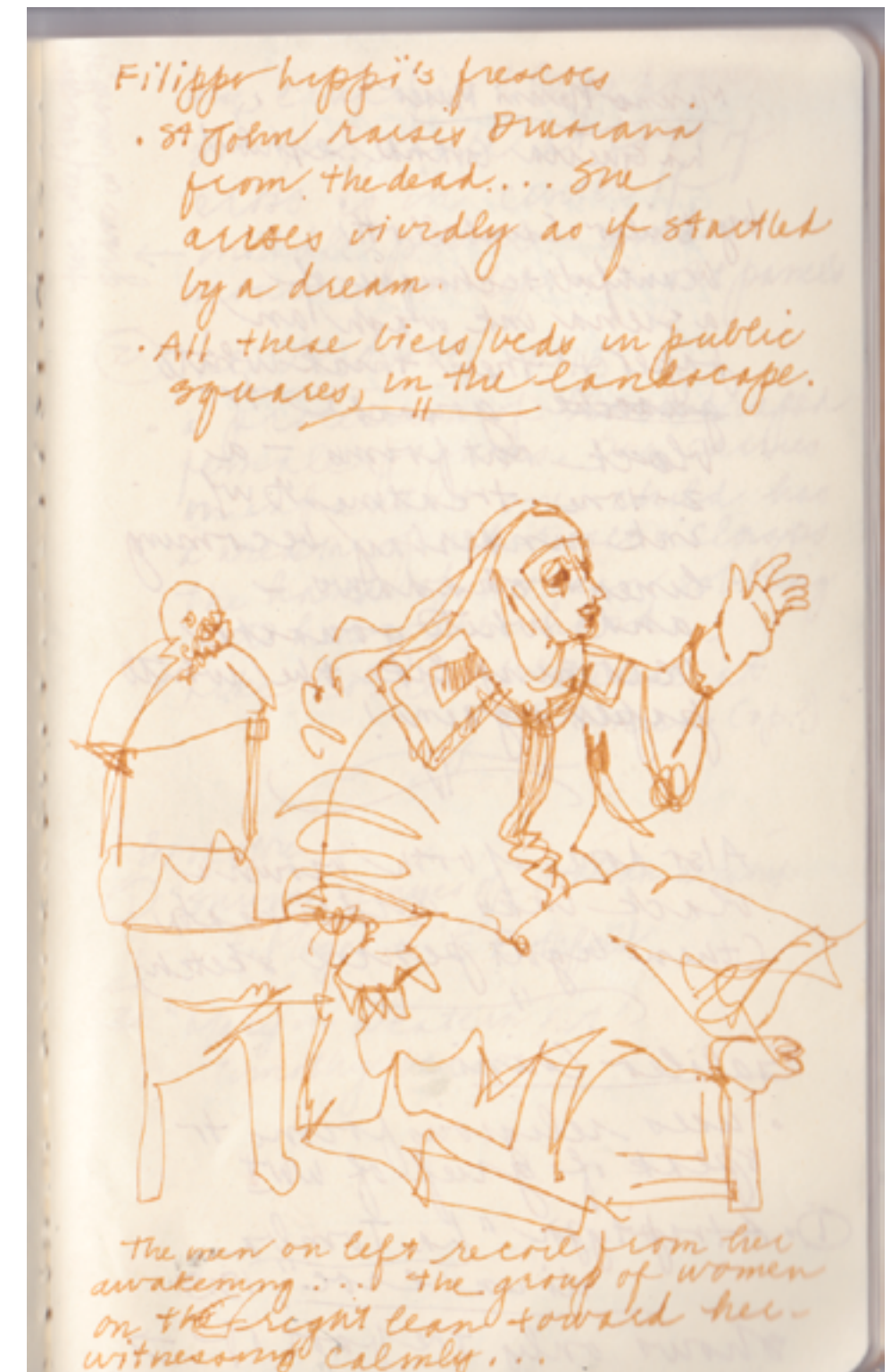


Fig. 7-Siena Triptych 2006



Fig. 8-Siena Triptych 2012

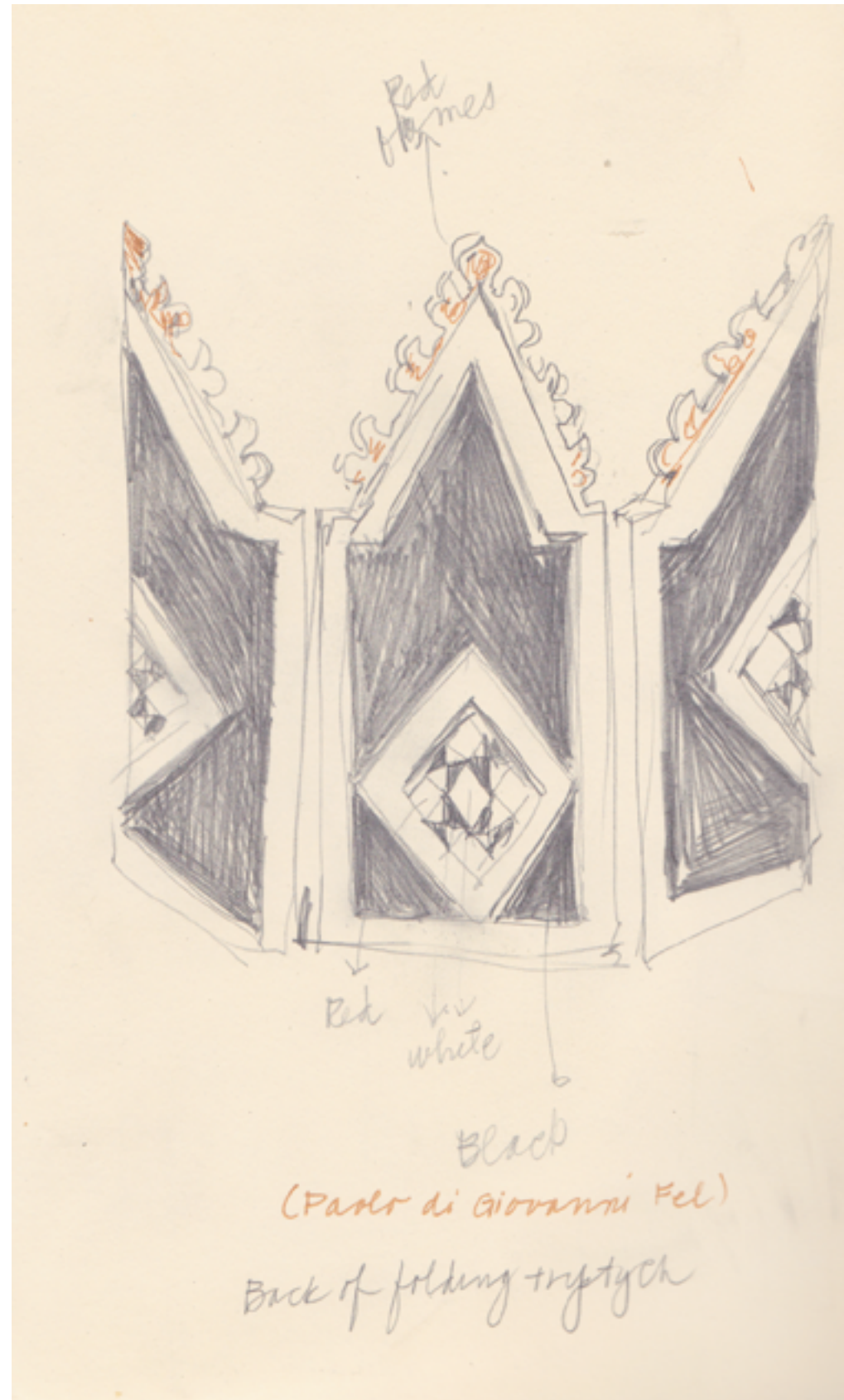


Fig. 9-Martini 2006



Fig. 10-Martini 2012



Fig. 11-Rego-Pillowman-prop



Fig. 12-Rego-Pillowman-pastel



laid onto two-dimensional surface. (Fig. 11 & 12 previous page)

Echoing traditions of Renaissance storytelling, Rego sources inspiration from narrative sources: referencing literature and theatre, nursery rhymes and fable, as well as parable commentaries around historical or religious narratives. She draws out of these imaginal source materials, not to represent or replicate as companion to the written text, but in order to invent new pictorial reports. Rego doubles these imaginative works as re-imagination through images – not as illustrations, but as overflows of expressive content. (Fig. 13, 14 & 15)

Her working procedure is always direct observation. Thus, as a critical stage in her image-making process – she will fabricate and arrange elaborate stage sets of dummies, costumes, props. Live models populate her work in repeating figurations - like the multiplied devotional char-

Fig. 13-Rego-Muses-prop



Fig. 14-Rego-The Young Poet-drawing

acters found in continuous *narrative* painting traditions of Renaissance Christian art. Nevertheless, the meaning and message of her expressive goals are reached *only* once translated into drawing - or *through* the imaginative trace of her pastel work (itself applied within the tactilely-direct methods of *drawing*). Thus her *tableau vivant* installations are dormant notational structures, not the ultimate artefacts of Rego's imaginative world. That world reveals itself by a process of drawing, in



Fig. 15-Rego-Discarded Muses-drawing

the tracks of hand upon a surface, in perceptions detected from beyond the barrier of solid prop and set. Rego breathes life into drawing; in an alchemical collaboration of eye and hand the life of her vision enters the realm of the *seen*, only then arriving at - and embodying - its destination.

**Praxis: Part III**

**Drawings from the Edge of Perception**

Whilst the perception of...pictorial space has some kinship with our normal viewing of the world, it is also radically separate from it. Normal perception is mobile, whereas the relationship between the notional viewer and subject-matter in pictorial space is absolutely stationary...it suspends our normal attitude towards the visual world. Instead of the subject-matter being present to perception as such, it has the character, rather, of...presentness.<sup>21</sup> (Crowther, 2009: 55)

The fact that drawing can discern unexpected edges of perception does not limit its queries to *only* literal disclosures of peripheral vision – though certain artists, like Pierre Bonnard, approached such zones to peer into the more ephemeral qualities of vision. Other artists, notably Degas and Monet, had professed unique visions despite, or even because of, perceptions impacted by defects in their physical visual faculty.

More recently, Louise Bourgeois used drawing to mimic (or glimpse) the comforts of her own elusive sleeping life through her *Insomnia Drawings* (1994-95). Works such as these acknowledge the transitory state of life in itself – a transience which we are at pains to refute while we impose our linear logical orderings - like our invention of time. Our days, and our place among these days and nights, are fleeting, always in the process of slipping away toward the past. So the accomplishment of the work of art remains a statement of meaningful vision that can survive such impermanence at the heart of all organic existence.

**Looking after loss: On Bonnard and Gorky**

**Bonnard**

Bonnard visited the world in a different way...Only in the studio did Bonnard begin to assemble images, to allow memories to float in and out of his working process.<sup>22</sup> (Burnham, 2009: 72) (Fig. 16 & 17 in following pages)

Pierre Bonnard employed drawing to capture notations of fleeting perception, and then would turn those fragile impressions into paint-

ings that were recorded layers of his visual memory. Bonnard routinely placed his wife, Marthe, inside his pictorial inventions. As his model and muse for fifty years, Marthe was often revealed as vague impression, a form neither solid nor obvious to first glance, a diffusive presence within the colours and traces of the transient moment held by his composition. Following her death in 1942, Bonnard was commissioned to make a series of gouache sketches for a Paris dealer. Inside these late interiors – works like *Marthe entering the room* and *Yellow Interior* – she lingers at the edges of his vision. Even on the threshold of life and death, Marthe remained intermingled with how Bonnard understood his surroundings. Thus, while her flickering presence had dissolved from the tangible (the *visible*), she was sought and found still; her trace (the *invisible*) inhabits his view into different imaginings of the temporal.



Fig. 16 (above) -Bonnard-Marthe Entering the Room



Fig. 17 (right) -Bonnard-Yellow Interior

**Arshile Gorky**

Visual art centres on the creation of enduring, aesthetically significant spatial artifacts... Sensible particulars whose meaning is only fully emergent if directly perceived qua visual...In the visual artwork...subject and object of experience are made to exist in a heightened and enduring form.<sup>23</sup> (Crowther, 2009: 4-5) (Fig. 18 & 19 overleaf)

I grew up outside of New York City, and so first encountered my inter-

21 Crowther, P. (2009), *Phenomenology of Visual Art (even the frame)*. Press. p. 55  
 22 Burnheim, R. (2009) 'Intelligent seeing' from *Pierre Bonnard: Late Still Lifes and Interiors*. New York & New Haven: The Metropolitan Museum of Art and Yale University Press. p. 72.

23 Crowther, P. (2009), *Phenomenology of Visual Art (even the frame)*. pp. 4-5.



Fig. 18-Gorky-The Artist and His Mother-Whitney

est in art through school trips to Manhattan's great museums. At the Whitney Museum of American Art, I recall seeing Arshile Gorky's *The Artist and His Mother* (1926–36). I didn't need to actively aware of the story behind this painting; it was the work itself that struck me. It held its power beyond its narrative aspect –not unlike Picasso's *Guernica*, itself then a refugee in the nearby Museum of Modern Art. Such work transmit a meaning and affect beyond the expository representations – doing so because it can convey some trace of what was felt and expressed by the making, of the artist's interior response to an external event which they strove to witness into publicly-conveyed expression. So I reference this Gorky work – not to review the painting's tragic inspiration – but



Fig. 19-Gorky-The Artist and His Mother -photo

to see it as part of a body of work that Gorky generated from a singular photo - the only photo of the artist with his mother to survive her death along the flight of the Armenian diaspora in 1919. The photo itself was a formal portrait that had been taken and sent ahead to Gorky's father, who had already emigrated to the United States. (Fig. 20 (right), 21, 22, 23, 24 & 25 overleaf)

Gorky's image-making process here – besides two versions of this painting (the other at The National Gallery of Art, Washington, D.C.) – also includes a number of drawings: some are direct preparatory designs for the paintings, while others appear to be independent works



Fig. 20-Gorky-Portrait of the Artist and His Mother-drawing

as sketches and studies. These collected works demonstrate the quality of transmutation and sublimation that drawing can afford within the transfer of emotional memory into image. When the impacts and residues of an uncontainable interior state spill over; then affect may be redirected into the external visual form. This allows the maker, as instigator of this expression, the opportunity to stand back and regard their own interior intensity as something now articulated into the external. If we consider the formal terminology that attends artistic method, this undertaking of the 'study' is often attributed to works of drawing on paper. The immediacy of the material activity of drawing proves





Clockwise from top-left:

Fig. 21-Gorky- Study for Portrait of the Artist and His Mother-drawing]

Fig. 22-Gorky- Study for Portrait of the Artist and His Mother-drawing]

Fig. 23-Gorky- Study for Mother and Son-drawing]

Fig. 24-Gorky-The Artist's Mother-drawing]

Fig. 25-Gorky-Two Studies for The Artist and His Mother- ink drawing]

particularly useful to facilitating a process of *study*, to the urgency of transforming previously unfiltered feeling into more a composed visual artefact. Even this term ‘composed’ holds a double definition here: the creative configuration of the work, but also the interior steadying of the initial emotional impact. Gorky, like Bonnard, sought a view beyond the immediately apparent; he sought to stand back and inspect an interior impression from without.

**Sibling Reveries**

It is the principle of an essential simultaneity in which the most scattered and disunited being achieves unity...Every poem, then, contains the element of time stopped, time which does not obey the meter, time which we shall call *vertical* to distinguish it from ordinary time which sweeps past horizontally along with the wind and the waters of the stream.<sup>24</sup>

(Bachelard, 1971: 195-196) (Fig, 26, 27 & 28)

Art and culture were not a part of my working-class upbringing or its immediate environment; so it was indeed fortunate to grow up within school trip distance of New York City’s cultural treasures. My father – a man who regretted his limited education, and who was hard-working and always pressed for time – subsisted on the condensed offerings of *Reader’s Digest*. It was there where he saw the reproduction of Mary Cassatt’s ‘The Child’s Bath’. The resemblance of the child of that title was so eerily close to that of my younger sister, Jill – it was almost as if we’d caught her out living unbeknownst in the previous century. Jill was a person with special needs, so the uncanny likeness of Cassatt’s model did not appear to impress her, as it had the rest the family. My parents quickly purchased a reproduction of the painting and had it framed. This was the only work of art ever displayed in our home. (Overleaf Fig. 29 & 30 )

I finally saw this work in person at a Cassatt retrospective decades later, where it still appeared to me as an unsettling depiction of a family member, rather than as a well-known and somewhat sentimental 19th century painting. When Jill passed away just a few years ago, my impulse – like Bonnard or Gorky – was to reach back through drawing in an attempt to re-inhabit another point along the transient horizon of time, to grasp after a fleeting something below the surface of relationships, of the family dynamics, in order to cast my troubled memories outwards and externally. My sister, because of her mental and physical handicaps,



had always been an odd presence in my life – someone I’d always known yet would never really know at all. So I drew the Cassatt reproduction; then drew from early photos. The drawing process provided an opportunity to review, to feel my way into a fuller comprehension of response to Jill’s passing out from the physical and perceptible *reality*, and from her place in life of the family



Clockwise from top:

Fig. 26- Dad with Jill

Fig. 27- Cassatt- Readers Digest Nov. 1959]

Fig. 28- Cassatt- The Child's Bath



24 Bachelard, G. (1971) 'The poetic moment and the metaphysical moment'. *The right to dream*. Translated from French by J.A. Underwood. New York: Viking Press. pp. 195-196



[Imperatore-figure 29-After Cassatt after Jill]  
[Imperatore-figure 30-Salt]



**Conclusion**

When through the water's thickness I see the tiling at the bottom the pool, I do not see it despite the water and reflections there; I see through them and because of them...(If it were without this flesh that I saw...then I would cease to see it as it were and where it is...its active and living presence.<sup>25</sup>

(Merleau-Ponty, 1993: 142)

In his last published essay 'Eye and Mind' (1961), Maurice Merleau-Ponty portrays the artist as one who leans or lends his body into the world, to then perceive without preconception. Thus, a clearer view can emerge into vital understanding through *artistic translation* – allowing for a broader vantage point upon the see-able by *looking-through-drawing* and *looking-into-drawing*. For Merleau-Ponty, this expressive task 'offers the gaze traces of vision, from the inside, in order that it may espouse them; it gives vision that which clothes it within, the imaginary texture of the real'<sup>26</sup> (Merleau-Ponty, 1993:126). *Drawing* is a practice of perceptual inhabitation, that - once captured - lives in the subsequent perceptual encounters between the viewer, the draughtsman and the artefact.

The visual disposition requisite for transcription through drawing enacts truer perceptions of the *transient* and the *liminal* than the rapid edits and transitory interpretations that are the received in the normal applications and operations of vision. In drawing, we step away from *norms of perception* – not *necessarily* as a pathological rupture of visual capacity – but through *partial suspensions* and *relative sublimations* - seeking embedded associations once are held in abeyance. There we facilitate a fresh sense of *what – or what else – is presence (habitation)* and *present (temporal)* in perception.

<sup>25</sup> Merleau-Ponty, M. (1993) 'Eye & Mind', *The Merleau-Ponty Aesthetic Reader: Philosophy and Painting*. Galen A. Johnson, editor. Evanston, IL: Northwestern University Press. p. 142.

<sup>26</sup> Merleau-Ponty, M. (1993) 'Eye & Mind', p. 126.

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**Images****Work of the author:**

Figure 1: Imperatore, L. (1997) *Water Dream* [Charcoal on paper]

Figure 2: Imperatore, L. (2008) *Vigil* [Graphite & ink]

Figure 3: Imperatore, L. (2007) *Sleeping/Around* [Graphite & ink]

Figure 4: Imperatore, L. (2012) *Palinopsia Redux* [Graphite]

Figure 5: Imperatore, L. (2006) *Lippi's Drusiana* [Ink]

Figure 6: Imperatore, L. (2012) *Lippi's Drusiana* [Graphite]

Figure 7: Imperatore, L. (2006) *Siena/Triptych* [Graphite & ink]

Figure 8: Imperatore, L. (2012) *Siena/Triptych* [Graphite]

Figure 9: Imperatore, L. (2006) *After Martini* [Graphite]

Figure 10: Imperatore, L. (2012) *After Martini* [Graphite]

Figure 26: Imperatore, L. (2012) *Dad with Jill* [Graphite on paper]

Figure 29: Imperatore, L. (2012) *After Cassatt/After Jill* [Graphite on paper]

Figure 30: Imperatore, L. (2012) *Salt* [Graphite on paper]

**Other artists:**

Figure 11: Rego, P. (2004) *The Pillowman in the Studio* [photo: Gautier Deblonde] In: McEwan, J. (2008) *Paula Rego: Behind the Scenes*. London & New York: Phaidon Press,153.

Figure 12: Rego, P. (2004) *The Pillowman* [pastel on paper on aluminium] In: McEwan, J. (2008) *Paula Rego: Behind the Scenes*. London & New York: Phaidon Press,162.

Figure 13: Rego, P. (2007) *Props for the Muses* [photo: Gautier Deblonde] In: McEwan, J. (2008) *Paula Rego: Behind the Scenes*. London & New York: Phaidon Press,197.

Figure 14: Rego, P. (2007) *The Young Poet* [Graphite and conte pencil on paper] In: McEwan, J. (2008) *Paula Rego: Behind the Scenes*. London & New York: Phaidon Press, 203.

Figure 15: Rego, P. (2007) *Discarded Muses* [Graphite and conte pencil on paper] In: McEwan, J. (2008) *Paula Rego: Behind the Scenes*. London & New York: Phaidon Press, 201.

Figure 16: Bonnard, P. (1942) *Marthe Entering the Room* [Gouache & pencil on paper] In: Amory, D., ed. (2009) *Pierre Bonnard: Late Still Lifes and Interiors*. New York & New Haven: The Metropolitan Museum of Art and Yale University Press,166.

Figure 17: Bonnard, P. (1942) *The Yellow Interior* [Gouache on paper] In: Amory, D., ed. (2009) *Pierre Bonnard: Late Still Lifes and Interiors*. New York & New Haven: The Metropolitan Museum of Art and Yale University Press, 73.

Figure 18: Gorky, A. (c.1926-1936) The Artist and His Mother [Oil on canvas] <http://whitney.org/Collection/ArshileGorky/5017> [Accessed: 25/08/2013]

Figure 19: (1912) photo: Arshile Gorky and his mother, Van, Turkish Armenia, courtesy of Dr. Bruce Berberian. <http://sites.moca.org/thecurve/2010/07/15/the-artist-and-his-mother/> [Accessed: 18/07/2013]

Figure 20: Gorky, A. (1926/1936) Portrait of the Artist and His Mother [Graphite on squared paper] In: Lee & Lader, 2003) Arshile Gorky: a Retrospective of Drawings. New York: Whitney Museum of American Art. 117.

Figure 21: Gorky, A. (1926-1936) Study for Portrait of Artist and His Mother [Graphite on paper] In: Lee & Lader, 2003) Arshile Gorky: a Retrospective of Drawings. New York: Whitney Museum of American Art. 119.

Figure 22: Gorky, A. (1926-1934) Study for Portrait of Artist and His Mother [Graphite on paper] In: Lee & Lader, 2003) Arshile Gorky: a Retrospective of Drawings. New York: Whitney Museum of American Art. 115.

Figure 23: Gorky, A. (1936) Study for Mother and Son [Graphite on paper] In: Lee & Lader, 2003) Arshile Gorky: a Retrospective of Drawings. New York: Whitney Museum of American Art. 118.

Figure 24: Gorky, A. (1926 or 1936) The Artist's Mother [Charcoal on laid paper] <http://www.artic.edu/aic/collections/artwork/23684> [Accessed: 18/07/2013]

Figure 25: Gorky, A. (1926-1934) Two Studies for "The Artist and His Mother" [Ink on brown paper] <http://arshilegorkyfoundation.org/catalogue/works-on-paper/ML666> [Accessed: 18/07/2013]

Figure 27: La Toilette (from 'Mary Cassatt – Pioneer Woman Painter') Readers Digest, Vol.75, No.451. November 1959. Pp.228-229

Figure 28: Cassatt, M. (1893) The Child's Bath [Oil on canvas.] <http://www.artic.edu/aic/collections/artwork/111442> [Accessed: 18/07/2013]

# Justice & Williams | Motion, Light, and Space: Gesture in the Digital Age

## Abstract

This is a report on a collaborative, trans-media, drawing project. Two artists, Tree Williams and Sean Justice, explored digitally mediated drawing and the assumptions at the core of conventional practice, namely, the primacy of touch. In traditional drawing, the body touches pencil which touches paper. Whether the stylus is chalk or charcoal, or the substrate canvas or chipboard, touch is essential. Even if the human body is removed—for example, if a servo-driven prosthesis maneuvers a pencil—marks are made from the touch of graphite on a surface. How does digital drawing change this notion of touch? If there is no stylus and no surface, what remains of touch, not to mention, the body? Is it correct to claim, as some do, that the body necessarily disappears? Or disintegrates? Counter to that proposition, here the artists begin from the idea that transforming touch with digital materials might in fact re-integrate the body. Contrary to traditional media's hyper-individuated touch, which can fragment and thus reify the alienation of subjective agency, here the question becomes whether digitally mediated touch reemphasizes gesture, thereby repositioning embodiment closer to the core of collaborative and shared agency.

## Biographical details

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*Tree Williams* is a mixed-media abstract painter who layers form and movement together in a visual response to the fluctuation of nature. She is a doctoral student at Teachers College in the Art and Art Education Program.

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## Introduction

This collaborative, trans-media drawing project came out of doctoral seminar conversations between the two participants, Tree Williams and Sean Justice, who are in the art and art education at Teachers College, Columbia University. In the seminar, a visual art colloquium combined with an advanced studio practicum, Williams presented a scroll-like panoramic drawing made with ink and brush lines, which Justice likened to traditions of collaborative mark-making such as the Surrealist's drawing game, *exquisite corpse*. The ensuing conversation touched on notions of time and space, collaboration, gesture, and the possibility of expanding the traditional canvas, which by default, it can be argued, excludes the viewer from active engagement. The expanded canvas, on the other hand, might open the work to interactivity and participation, and might be accomplished with computer programming and the Internet.

At the core of the conversation were questions about the way digital studio practice is different from traditional art practice. A common position—e.g., that intentions and motivations behind digital art are wholly and irretrievably divorced from those of traditional practice—came under fire as too limited and perhaps even flat wrong. From time to time these conversations engaged the entire seminar group, in part because several participants, i.e., in addition to Sean, were actively pursuing digitally based practices. As such, some of the assumptions at the core of conventional art practice were debated in class, namely, the primacy of touch. That is, for example, in a traditional drawing, the body touches pencil which touches paper. Whether the stylus is chalk or charcoal, or the substrate canvas or chipboard, touch is essential. And even if the (human) body is removed—for example, if a servo-driven prosthesis maneuvers a pencil—marks result from the touch of graphite on the surface of the paper.

Does this material relationship of touch to substrate hold in a digital drawing? More broadly, how and in what ways is the relationship transformed? That is, if there is no stylus and no surface, what remains of touch, not to mention, the body? Is it correct to claim, as some do, that the body necessarily disappears? Or disintegrates? And if it does, what is the effect on art practice—and, by extension, on art education? (See Hansen 2004 and Mitchell & Hansen 2010 for extended discussions on the relationship of digital media to embodiment.)

These are weighty and far-reaching—and perhaps unanswerable—questions. Around the seminar table we nurtured the conversation by reading and responding to Benjamin, Bishop, Foster, Scarry, and

Sontag, among many others. As a result of talking about and sharing our respective art-making practices, we decided to begin our work on this project from the proposition that transforming touch into the digital might re-integrate a body that had become fragmented. As such, counter to the standard position—i.e., that digital materials preclude embodied art making—our question became: how are traditional mark-making sensibilities repositioned by a relational, digitally networked, process? That is, in distinction from what can be seen as traditional media's hyper-individuation, which can fragment and thus reify the alienation of subjective agents (e.g., in the sense that an *individual* mark is produced by and owned by an *individual*), we wanted to explore whether digitally mediated touch can emphasize a communal gesture, thereby repositioning embodied action closer to the core of collaborative, or shared agency (e.g., *we* make the mark *together*).

At the time of this project's inception, in the fall 2011, the way forward was not clear, but both of us knew we wanted to explore each other's working process. But one thing was clear: neither of us wanted to write an essay arguing our claim. Rather, we wanted to make something collaboratively that would, by its existence as an artwork, invite participants into further conversation about an embodiment in digital art practice—and by extension, art education. This paper, consequently, does not argue a position but instead describes a process of exploration, and presents some our reactions to that process.

The first section presents Tree's drawing practice in relation to the foundational motivations of this project. The second section describes Sean's reaction to the work that Tree shared with the seminar group, and his subsequent invitation to collaborate. Section three describes our collaboration and the process behind the digital composite drawings we've made, including descriptions of the challenges of digitally re-imagining the gesture at the heart of Tree's drawings, and explanations of the basic technical details of the composites themselves. And the fourth section illustrates a vision of an artwork we would like to make, but which (as of this writing in early September 2013) remains on the drawing board, so to speak.

## Section One: Tree's Process

### A. A Sacred Space Beyond the Tangible Moment

In an attempt to trace my process and to discover how an artist gets into the richness of art making, I decided to make a large-scale drawing using ink on paper. I was interested in line and movement and in

how both of these affected my brain in ways that allowed me to get into a place of *flow* (Csikszentmihalyi 1996)—a place where I’d lose time, thought and awareness.

Around 6:45 pm one evening I started to work on an abstraction hanging in hallway of my small studio apartment. Normally, my most creative hours are from about 12 am to 4am, and well into the morning. Unfortunately, this was not an option that evening, so I decided to pretend. Hoping to stay in tune with my thoughts, I did not play music and instead minimized all controllable distractions. But mental ramblings from a difficult day of teaching, and overall frustrations with life, threatened my momentum more than I expected. Clearly, the task demanded its own hierarchal way of working without the added pressure of having to capture and hold onto a particular state of consciousness.

Eventually I became engrossed in the act of drawing itself—continuously adding charcoal lines, strokes, and layers methodically and ritualistically to the paper. There were snags as my mind tried to bracket pivotal spans of time that appeared as true reflection. Eventually the mental clutter dissipated, and I entered the *space*.

It was as if I had walked into a field of continuous exhalation. I felt thoroughly engaged in the moment, undisturbed by thoughts of past or present. I felt elated, uplifted, at one with the work and the self. As well, there was a sense of non-human empowerment. Indeed I felt tapped into a quintessentially enhanced verve. As a result I decided to name the experience *A Sacred Space Beyond the Tangible Moment*.

“Sacred” connotes reverence, veneration, and in some instances an association with religion, but I am less likely to call the experience I had religious. However, there was an aura about the space worthy of that type of respect. It was comparable to inhaling a perfect breath. Space is an unlimited realm, a multi-dimensional expanse within which material objects and events are located. It’s this tangible *realness* that I’m trying to access by using the word *space* to describe the experience of making art that night. At that moment the external band around me dissipated, and I was cocooned by an all-encompassing dwelling. When I am in that space I connect with a greater awareness of all that I know to be real and true. As far as transitioning into that space, though, it varies and can be sporadic—and the smallest thing can interrupt the session. I never really know when it is going to happen or how I will get there, or if I will stay there. It simply comes when it comes.

Fig 1 (tangled knot of black and brown lines); title:  
*A Sacred Space Beyond the Tangible Moment*



B: *Moving Toward the Collaboration*

After working through some of my ideas about the *Sacred Space Beyond the Tangible Moment* I decided to continue to draw and paint, keeping this concept in mind. The next time, though, I created a smaller drawing, more horizontal than vertical, folded like an accordion book. As I began to apply the ink to the paper I allowed each mark to happen organically. The intrigue was in not knowing how the lines related from

one panel to the next, or indeed *if* they would relate to each other. But I didn’t worry about it too much; if I was able to enter another special space, great—however, that was not my primary focus. Eventually, I had in front of me an extremely long panel (approximately 8 feet in length) of undulating lines. The completed work reminded me of tribal mark making, or ritualistic, symbolic mappings. I took the piece to seminar and discussed the process and product with my colleagues.

During the discussion Sean mentioned the exquisite corpse and elaborated on the relationships he saw between that Surrealist game and my piece. Though not familiar with it previously, I found that the notion of the exquisite corpse, as a process, highlighted the element of surprise and mystery that I was trying to access in my own art making. The difference was, of course, that where the Surrealists gathered a group together, and each person added an image or text to a piece of paper as it was passed on to the next individual, I had been working on my own, but in a space where the individual mark making was not my primary focus. In fact, I had participated in group-oriented exquisite corpse activities before, but had not been thinking about them when I made the accordion drawing.

A few weeks after that seminar session Sean and I were talking about my drawings and he suggested we collaborate on a project remixing my lines with a computer in order to animate them. I was excited about the possibility of exploring the drawings from another perspective. I had seen some of his work with photographs and computer code, and recalled his ability to poetically breathe into the photographs. My first experience of that work left me mesmerized. So, the connection between our work was serendipitous. Something about those code-animated photographs kept me anticipating the moment, which inadvertently kept me in the moment. I looked forward to the meeting of the minds.

#### **Section Two: Sean’s Reaction and Invitation**

Drawing is gesture driven by the desire to leave a trace of our passing.

When I first encountered Tree’s thick rich strokes—cacophony dancing curling twisting—I remember the layers.

Struggle

Flow

Interrupt

Overlap



Interweave

Transform

Continuance.

Could there be a collaboration? Of what? Or maybe, of *when*?

Tree focuses on something direct and immaterial (an idea that comes too close to cliché)—she maintains a certain energy, let me call it *doingness*. Her mark contains the motion of her body, but only barely. Actually, that motion can't be contained; rather, her mark echoes, suggests, shadows her body, hinting at the passing swaying drifting edge of the knot of her consciousness. In her drawings gesture is transfigured in the immediacy of music or breathing and appears to animate the texture of time. I imagine her in the studio. She puts on headphones and plays Coltrane and then moves into some kind of space between the tip of the brush and the surface of the paper, becoming a balled up pent up cinched up energy, and then releasing that energy slowly into the lines of ink that flow from her.

Me: this is what I felt the first time I saw Tree's drawings. There is a way of knowing that cannot be verbalized, a passage in and through time that can be felt and lived in the present moment of its passing, but not articulated. These twisting bent swirled-up brush strokes initiate a cascade of awareness, some kind of gestural certainty or a sudden and absolute assuredness of presence, the inevitability of making a mark, leaving a trace, and of its ephemeral, transient, passing. I remember losing myself in the tangled weave of layered textures and arriving, inevitably, within sight of that passing—just as it dissolved.

We know that a moment of awareness is fragile, and will flee from the desire that wants to lock it into place, silence it, or restrain it. We understand, as well, that there is no escape from knowing that the gesture—the motion of the hand, arm, body that has created the mark we behold—has passed and disappeared, leaving us with only its shadow, a trace of its vibrancy.

A great sadness and wonder surprised me. Sadness: because such stillness is antithetical to Tree's works. Surprise: because I knew for the first time that sadness is inevitable; because the loss that comes from the recognition that the space between the shadow and the gesture that formed it can never be transcended; because I knew then that drawing, all drawing, is a memorial to loss and a reminder of the artist's absent, irretrievable, touch.

Where does this reaction come from? Can it be shared? And before the stillness of that absence envelopes us entirely, can the resonance of these drawings be translated, transferred, transmitted across and through a *material* space?

Perhaps, I realized, this was where I might participate. My work is with the machine, the network, and I play with the material of those specific relationalities—the code. But Tree has neither connection to nor interest in the computer. If there is a space for collaboration I am suddenly convinced that it emerges from the distributed connectivity of the Internet, and from the possibility that the digital code can contribute a new dynamic new to these drawings. I'm not sure how, or what that might mean, but I know that I want to thread the visceral gesture of Tree's drawings through the mesh itself, and embed it in the vastness of the network, to release the pulsing knot of consciousness that created these drawings to the wide sea of human awareness that saturates the machine, saturates it through and through.

*KnotTangleEntangleTieWeaveWarpStitchHookThreadFlowPuls  
ChurnRoil*

So, finally, what would such a collaboration look like?

Light

Ink

Paper

Pixels

Light

...a return to the visceral breath that sustains the connection between imagination and desire.

This project will combine the material and the immaterial, and attempt to reinvigorate gesture and distribute the shadow that marks its passing.

Distribution—to hold in one's hand; to wait; to breathe; to let go of knowing in order to initiate the slow disbursement of intention; to witness a return.

### Section 3: Notes on Progress

#### A: Light Drawing

The first iteration of our collaboration removed touch from the drawing

Fig 2 (black lines on white ground, wide format); title: Digitally composited light drawing.



process entirely. We decided to explore the gesture separated from the stylus and from the substrate—in effect, to imagine drawing as distinct from the mark made by touch. Tree held a penlight in a darkened room and we photographed the light trails created by her movement. We put a digital camera on a tripod and set the shutter speed very slow. When the shutter was released, Tree moved her arms and shoulders. Holding the flashlight in her hand, she tried to mimic (or invent again) the gestures that she had used while drawing with charcoal and ink on paper. The resulting time-lapse images—white lines against a very dark

Fig 3 & 4 (overleaf); title: Light trails, white on black, and the same image tonally inverted.



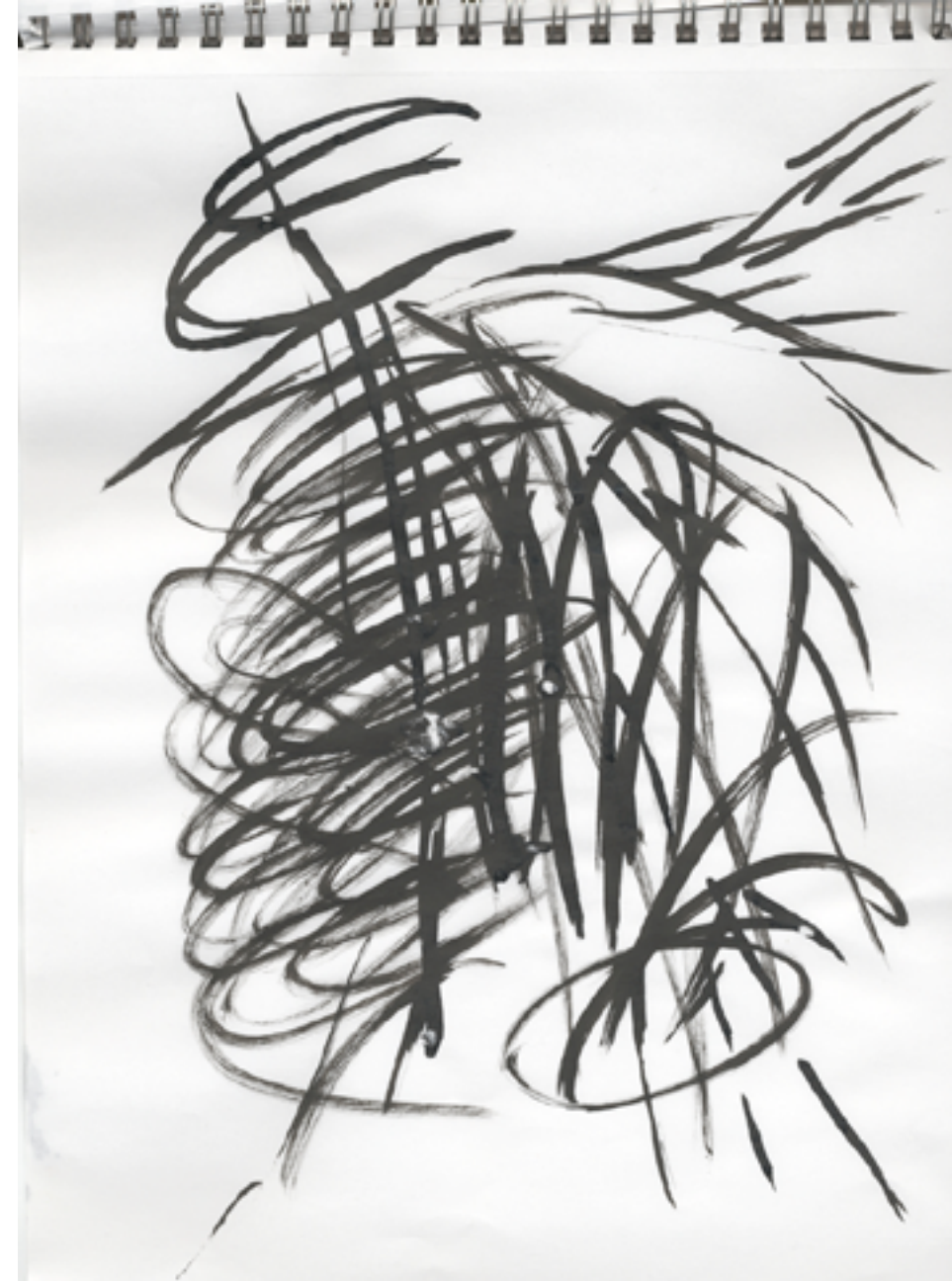


background (e.g., figure 3)—were processed as negatives (figure 2) and then combined in Photoshop as separate, overlapping layers (figure 2). The compositions intrigued us immediately but lacked the depth and urgency of Tree's prior, solo drawings. Subsequently we explored several variations on this photographic positive-negative time-lapse process, but were not satisfied with the overall results. We considered trying to animate the resulting composites with software or directly with a programming language, such as Processing or Javascript, but decided, in the end, that the flat blackness of the resulting lines would not be sufficiently captivating to warrant the additional work.

**B: Scan Drawing**

Our second and third iterations began with scans of ink drawings that Tree had made and that Sean scanned with a flatbed scanner. The first group of scans were from drawings on 13 x 17 inch drawing paper; they were scanned using a basic flatbed document scanner (figures 5, 6, 7). The scans were loaded into separate layers in Photoshop, and a drop-shadow effect was added to increase the illusion of depth (figure 8). As with the first iteration, however, we did not see the vibrancy of Tree's initial drawings in the results, so we decided not to pursue this process further.

After this latest round of unsatisfying attempts we took a step back to talk about our process and to figure out how we might retrieve the



*Fig. 5*

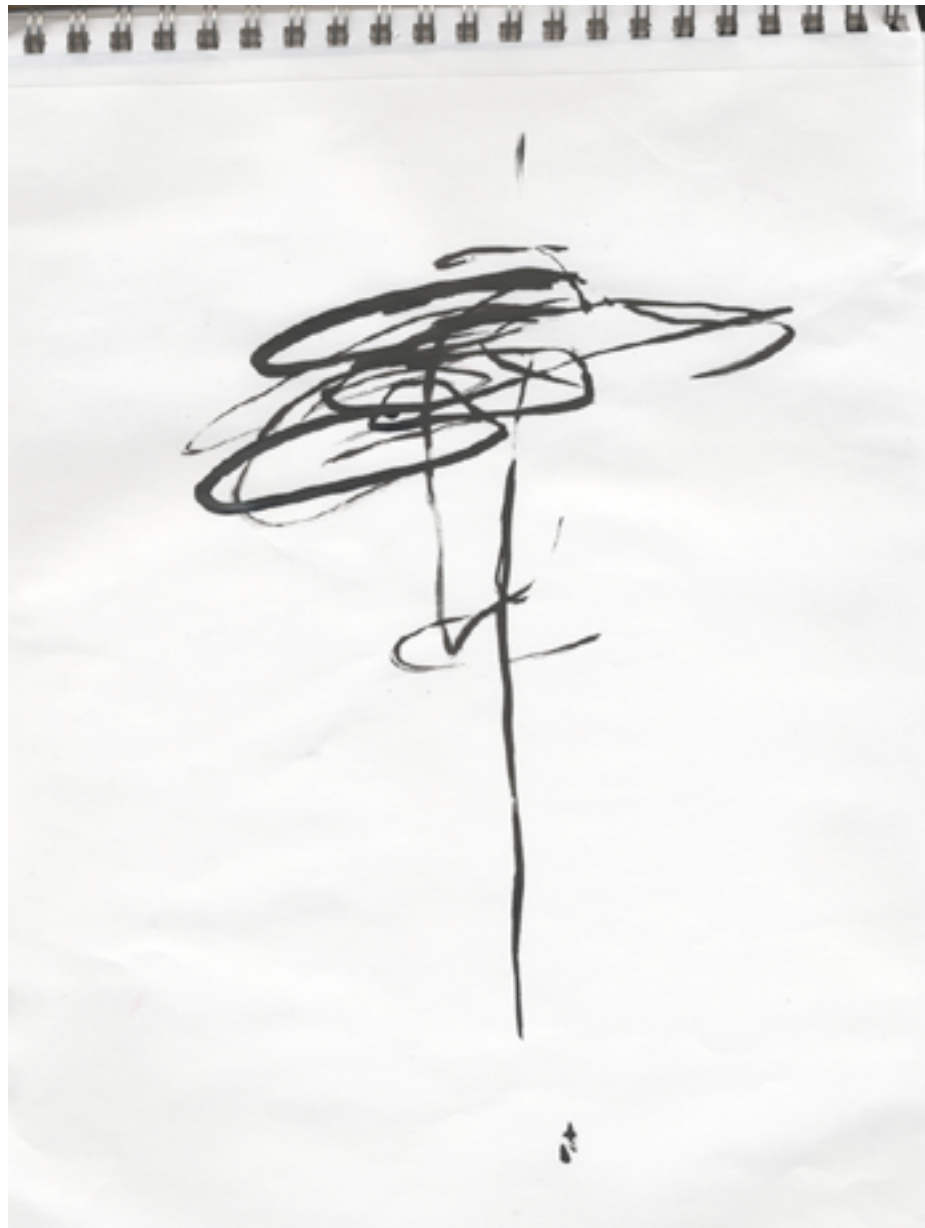
energy that had motivated us to collaborate in the first place. At that meeting Tree discussed her sense of space and gesture, and explained that the overlapping and interweaving marks came from feeling a connection between bodily movement and the time in which that movement occurred. To remedy the inherent disconnect between that sense of embodied connectedness, Sean suggested that Tree overlay her individual drawings while she was making them, for example, by taping



translucent paper on a window so that the light from outside would make the marks show through the underlying surfaces. In this way perhaps each subsequent mark would visually interact with previous ones.

With that idea in mind, Tree used a vellum surface for the next set of drawings, and an ink pen rather than a brush. The second set of scans was made from this group of drawings. As individual gestures, the marks felt lyrical and suggested dancing, or floating (figures 9, 10, 11), and the layered composite (produced in the same way as the previous ones) felt like an airy landscape, or a flat Chinese brush painting

Fig. 7



(figure 12)—and emanated a far different emotional resonance than the earlier drawings. To Sean, this difference in mood and space suggested whimsical fluidity, so he created an animated gif (using Photoshop) to explore the unexpected sense of lightness.

The animation can be viewed here: <http://xavierbonghi.com/drawing/gif/>.

Tree's reaction to the animation was enthusiastic, which indicated to Sean that perhaps the collaboration was finally going in the right direc-

Fig. 8



tion. Interestingly, this particular drawing (figure 12 and the animated gif) was the first image to include a substrate behind the marks (or, more properly, a visual representation of a substrate)—a design decision that was to figure prominently in our further work, and on our reflections on the work. (Fig. 9 (right top), 10 (right bottom), 11 & 12β (overleaf))

*C: Code-Animated Composite Drawing*

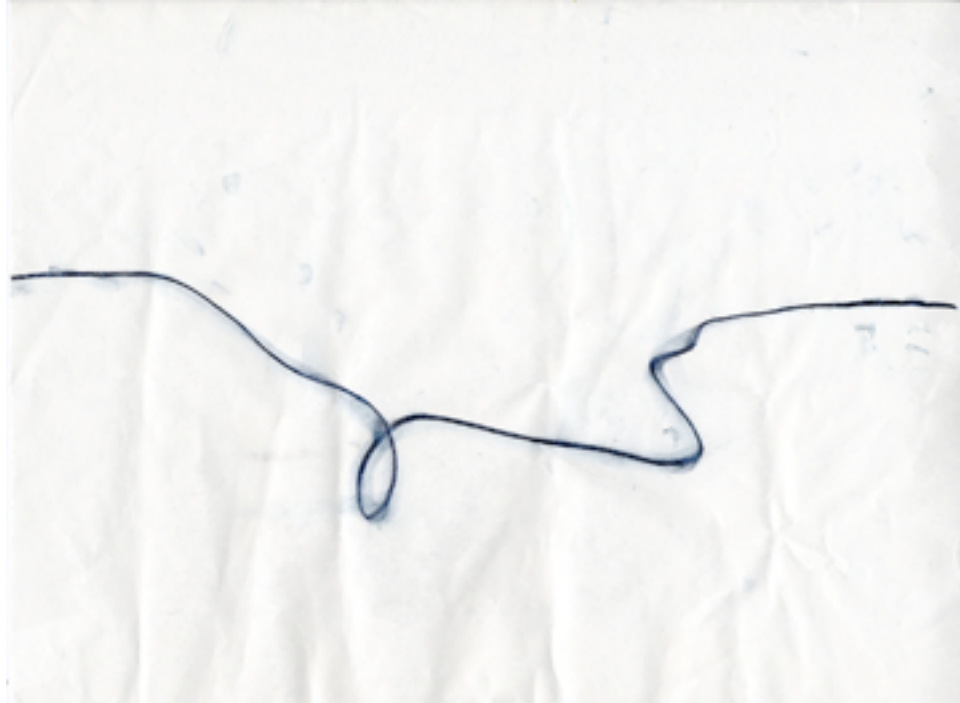
The fourth and fifth iterations occurred via long distance—that is, after Tree had left New York City for the summer. We kept a conversation



Fig. 9 (above) Fig 9, 10, 11 (individual lines); title: Scans of vellum drawings.

Fig. 10 (below)



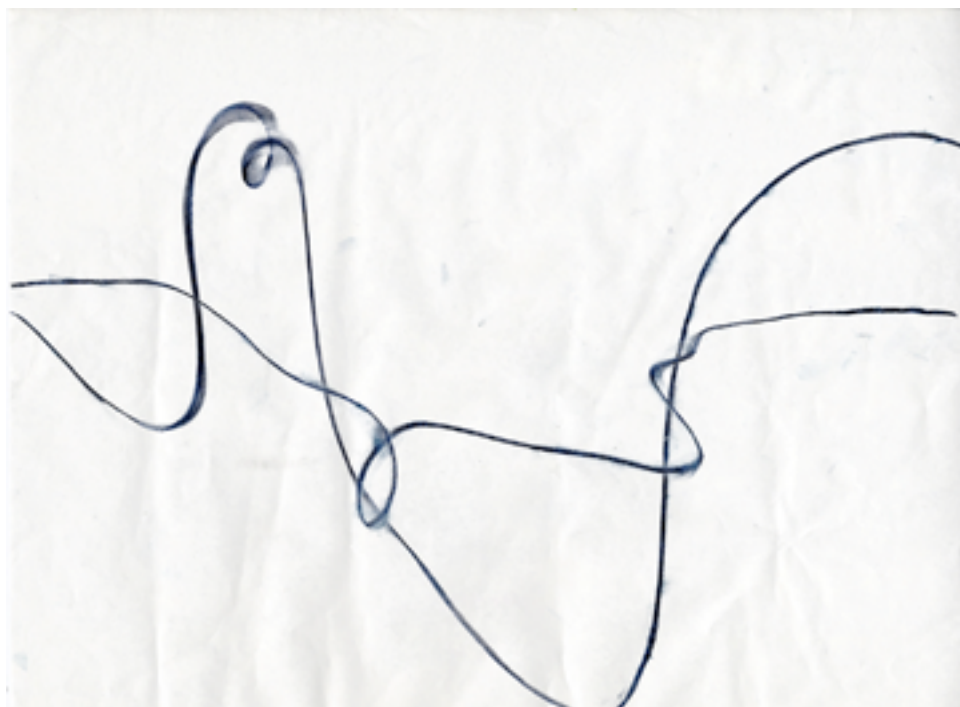


*Fig. 11 (above)*

*Fig. 12 (below) (composite of individual lines); title: Digital composite of vellum drawings.*

*Fig. 13 (centre)*

*Fig. 14 (right)*



going via email and SMS messages about how to proceed with the marks she was making on paper taped against a window. At one point Tree created a scroll-like series of marks that reprised, in a sense, the earliest drawings that Sean had seen in the 2011 seminar. These were made in Tree's Virginia studio and then photographed and emailed with an iPhone. The drawings, however, could not be separated into individual components because they had been photographed as they had been drawn—in other words, as physical composites on the windowpane, with the individual marks overlain on each other. This meant that there was no practical way to animate the various marks as discrete elements.



In response to the conundrum of the inseparable overlaps, Tree emailed another set of iPhone photographs of another group of drawings. This set, however, was photographed as separated components (figures 13 & 14). These 34 iPhone pictures—the fifth iteration of the collaboration—provided the breakthrough material for Sean to make a new and more complex animation using html/css code, and to introduce some minimal interaction (figure 15).

This fifth iteration was visually distinct from the others because the individual marks all lined up with each other around a central axis.





Fig. 15 (tangled knot of marks, vertical, thick in the middle); title: Digital composite of iPhone photographs of drawings.

Fig. 16 (right)

This graphical unity created a drawing with more drama and energy than the previous ones; here, the body and texture of the marks took on a voluminous, overlapping form that suggested a moody complexity reminiscent of the earlier drawings Tree had made on her own (e.g., figure 1). But the *functional* difference between this fifth composite and Tree's individual works is important: in the composite, the parts



of the image—the individual lines Tree had made—were cleaned up in Photoshop and stripped from their vellum background (figures 17 & 18). This enabled Sean to mix and re-mix them and to animate them with the html/css code of web based interactivity. (Fig. 17 & 18 overleaf.)

As preliminary sketches, or doodles of what might come next, Sean created several different composites from Tree's fifth set of lines. Some were animated and several were minimally interactive. For both of us, these fifth iteration composites felt more relevant to our project than any of the previous drawings, though Sean, particularly, was not entirely satisfied that the animation and interactivity had fully matured.

Some of these example web-composites can be seen at the URLs below. Composites 2 and 6 are animated by the html/css code, and Composites 3 and 4 react to the viewer's mouse when it hovers and scrolls.

<http://xavierbonghi.com/drawing/composite2/>

<http://xavierbonghi.com/drawing/composite3/>

<http://xavierbonghi.com/drawing/composite4/>

<http://xavierbonghi.com/drawing/composite6/>

#### Section Four: A Future Iterative Space

Based on the success of the animation and interactivity of the fifth iteration, the project took a major conceptual and formal leap, though it has not yet been realized in actual, functioning form. Rather, this future iteration remains at the level of concept and sketch. Some of its material characteristics have become clear, however. For example, it will be visually similar to the fifth iteration composites, but its animation and interactivity will be vastly more sophisticated. Figure 16 is a partial representation of the sixth iteration composite. The form of this remix is longer and narrower than the fifth iteration, and the roughly textured background of the drawing pad has been replaced by the vellum background from the dancing lines in the third iteration (figure 12).

[Williams-Justice figure 16 (knot of brown and grey lines, more slender than fig 15, longer and narrower overall); title: Digital composite drawing as projection, animated by interactive sensors and responsive code.]

As we are imagining it now, this new artwork will be presented on a wall as a large, vertically oriented, high-resolution projection—i.e., not as a website. The image will be positioned at the far end of a deep room or long hallway. When a viewer initially enters the exhibition space she will encounter the projected image from a distance. Fine detail will probably not be discernible. Rather, the basic shape of the



*Fig 17 & 18 (individual dark lines on white background); title: Isolated lines cleaned up and stripped of their background in Photoshop.*

tangled brown and black bundle of lines will appear as a fluctuating, pulsing knot of texture—a restless, barely contained concentration of shadowy energy. As the viewer begins to approach the image, however, the size and character of the knot will change; the jiggling fluctuations will become more energetic, and the bundle itself will begin to expand. Both of these characteristics will continue to change as the viewer continues to approach, until suddenly, at a distance just beyond the point where the subtle variations in color and texture of the composite would have become visible, the pulsing knot will fly apart, each individually gesticulating thread disappearing off the edges of the projection area. And if the viewer continues to advance toward the projection wall, the subtleties of the vellum substrate behind the knot will become visible, but no trace of the knot itself will remain.

But then, unexpectedly—if the viewer is patient—the wiggling edge of one strand of the knot will reappear at the far edge of the projection area. If the viewer remains completely still, another thread will appear, and then another, until slowly, very slowly, all the dispersed elements of the knot will drift back toward the middle of the projected area and reassemble in the center, pulsing slowly, rhythmically. This fragile state of tension will persist until the viewer moves again, at which point the knot will again become worried and skittish. And if another viewer enters the room, the knot will sense his presence and fly apart, leaving only the blank piece of vellum.

The realization of this piece belongs to the distant space of a future collaboration with a computer programmer, or code artist—someone who can help us construct the interactive software that would drive the described behaviors. Nevertheless, we imagine (hypothetically) that the drawing's digital interface will enlarge the scope of Tree's initial gestures to such an extent that the viewer's own sense of embodied participation would be utterly changed. That is, as the viewer moves, the drawing moves. In fact, we imagine that the relationship of self to artwork would be experienced as a physically resonant symbiosis, where the behavior of the drawing might be anthropomorphized as shy, bashful, fearful, and then, when it reappears, as friendly, or self-confident. Further, it's easy to imagine that the code controlling these interactive behaviors could be randomized so that no two encounters would be precisely identical.

And yet, as intriguing as these individual interactions might be, we suspect that the greater and far more provocative interactivity will occur



between pairs (or groups) of viewers. That is, imagine the museum visitor who has finally, with patience and slow breathing, coaxed the shy knot to reassemble—only to have it fly apart again as someone else enters the space. Here we might see an emergent interactivity based on collaborative participation. That is, in addition to the embodied experience of the individual viewer, as she inwardly calibrates her gesture and bodily movements to the rhythms and coded behaviors of the projected drawing, there emerges a turning outward, a movement away from the individualized, internalized experience, and a consequent movement towards an engagement with other viewers, with strangers. That is, in order to see the drawing at all, this particular pair of viewers—the first visitor and the subsequent visitor—will have to cooperate with each other and synchronize their movement (actually, their stillness) in the space.

The effect of such a fluctuating, ad hoc partnership would, we imagine, be driven by a coming together of conflicting desires—the desire to see the digital drawing versus the desire to remain solitary, i.e., to *not* make direct overtures toward a complete stranger. The alternative to collaboration, however, would be to either give up and walk away or to keep looking at the blank piece of vellum projected on the wall. Perhaps at that moment, standing patiently alone before the image of blank vellum on the wall while other museum visitors stroll unaware through the space behind her, a visitor might come to the realization that the actual *substrate* of the drawing is the social dynamic surrounding her. That is, due to the digitally mediated interface—the projected image, the coded animations, the programmed flocking and fleeing behaviors—the actual *material* of the drawing (i.e., the substrate upon which the artwork depends) is in fact not the picture of vellum, or even the wall, but the communal (and negotiated) integration of the space surrounding and embracing the accidental partnership of viewers.

### Conclusion

We realize that claiming to have reached a conclusion is premature, not least because we have yet to complete the artwork(s) we set out to make. We are satisfied however that our collaboration has helped us robustly explore questions about the effect of gesture and touch in digital drawing.

For example, in our so-called Sixth Iteration (yet to be fully realized), we've hypothesized a reinvigorated perceptual embodiment based on the way digital interactivity emphasizes gesture and leads to communal agency. As described above, we think this dynamic flows from a

redefinition of *substrate*: moving from a focus on the physical material that receives the touch of a solitary artist's hand, to an exploration of a dynamic and relational material that provides the ground for individual acts to coalesce to attain an immediately present goal.

We might go further to suggest that this kind of embodied materiality—the experience of an artwork as a willful act of negotiated viewing—depends on the kind of primal gesture that we used to assume belonged exclusively to the physical stylus and physical substrate. Here, however, the mark making only becomes clearly and presently viable when the characteristics of digital materials are leveraged in the artwork's onsite production. In this case, then, the gesture that creates the mark is an act of real-time communication between people, an outreach of awareness, a plea for cooperation and a desire for communal agency.

This doesn't mean that the tradition of physical touch has disappeared, far from it—in fact our work indisputably begins with Tree's pen touching vellum. It might mean however that the canvas has been expanded, perhaps even immeasurably. In this sense the collaboration between two (or more) parties becomes a new kind of drawing *material* that makes a new kind of gesture available, and perhaps a new kind of touch. This *digital* touch, rather than disintegrating the body, actually reintegrates it by prompting a reconsideration of what it means to be an individual embedded within a social space. At this point, after working together for nearly two years, it seems to us that the digitally mediated drawing process we've been exploring repositions embodied action closer to the core of collaborative, or shared agency. In other words, we make marks together.

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# Kane + Walton | Re-purposing Drawing in Textile Design Education: research and practice shaping pedagogy

## Abstract

Drawing is central to Textiles practice, and there is ample evidence to confirm the richness and variety of activity in contemporary making across a broad spectrum.

Within Textiles drawing has multiple purposes. Textile design education focuses on drawing as a key component of successful practice and it is embedded in most curricula: there is both an expectation of drawing confidence and a commitment to developing skill.

Drawing research has done much to define the process and purpose of drawing within the broad Art & Design context but less work has been done to examine the role and purpose of drawing and its relationship with textile practice and contemporary education.

This paper describes recent activity with First Year Textile design students on the BA Textiles: Innovation and Design programme at Loughborough University, concerning the re-evaluation of the role and purpose of drawing for textiles.

Using adaptations of drawing research methods and approaches within pedagogic contexts, the research has the aim of testing and setting a new agenda, which will re-define the purpose of drawing and align teaching to clearly support the development of good design practice whilst establishing future directions clearly integrating drawing into taught projects.

## Key Words

Drawing, Textiles, Making, Materials, Pedagogy

## Biographical Details

Dr Faith Kane is a lecturer in Textiles and leader of the Textiles Research Group at the School of the Arts, Loughborough University. After gaining her PhD, *Designing Nonwovens: Industrial and Craft Perspectives*, she taught constructed textiles at De Montfort University in Leicester, leaving in 2008 to take up her current position at Loughborough. Her current interests revolve around sustainable materials design and in particular the role and value of craft knowledge within this area. She is involved in her own practice-led research as well as the development of collaborative research projects and events. Current projects include ‘Laser Enhanced Biotechnology for Textile Design’ and ‘Textile Thinking for Sustainable Materials’.

Faith is also an editor of DUCK Journal for Research in Textiles and Textile Design, which provides an opportunity to engage in debate around textiles and textile design encompassing a range of approaches, disciplines and outcomes

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Kerry Walton is the Programme Co-ordinator for Textiles: Innovation and Design, School of the Arts, Loughborough University. Kerry is currently developing new practice led Textile work exploring the relationship between drawing and design for Textiles, specifically weaving; this project consolidates a strand of enquiry developing around the themes of drawing/textiles/practice within current research. She recently gave a paper at the Making conference in Norway (Lines of thought: Unpicking the relationship between textiles process and drawing), a paper presentation at the HEA Storyville conference in Brighton around similar themes aligned with educational imperatives, and presented a paper and exhibited work at the *Poetics and Praxis, Research Through Design conference at the Baltic centre for contemporary Art, in Newcastle September 2013*

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## 1. Introduction

Drawing has traditionally formed a substantial part of Textile Design curricula in British Art & Design schools and has historically played a crucial and important role in the development and production of designs for Textiles within the broadest range of contexts. The design narrative unfolds through a largely drawing based process of research, observation, analysis, speculation, ideation, specification, visualisation and then resolution into Textiles media.

However recent evidence seems to suggest that students are arriving on BA programmes less equipped, skilled and enthusiastic with regard to fundamental drawing skills, and with the advent of new creative digital technologies which may be perceived to make traditional notions of drawing redundant, the learning and teaching agenda for drawing in Textile Design education is changing. In a climate where students are less ready, able and willing to participate in drawing we must continually review and re-evaluate its role and function in a contemporary Textiles education. On the Textiles: Innovation & Design programme at Loughborough University we are committed to developing drawing in context, teaching skills rather than expecting competence and placing drawing at the core of a curriculum which takes account of the needs of a contemporary design world.

Art & Design education is a complex business: we work from and must continually develop a relevant overarching educational narrative, designed to direct teaching and support learning, but in Art & Design in common with other humanities subjects the individual’s narrative is also profoundly important: ideas, creativity and innovation all revolve around an individual set of core ideas and values in part informed by prior experience, which will ultimately inform choices and decisions. We are interweaving the goals of the educational activity with the development of a confident and informed use of a personal visual language.

Research based teaching goes a long way in supporting this. Recent observations and a changing educational environment have caused reflection, informed by research and practice, on how we teach within the textiles programme and specifically aspects of drawing. It would be fair to say that drawing traditionally underpins all disciplines within Art & Design, including the digital context.

In a recent review of *Tracing the Century: Drawing as a Catalyst for Change* Linda Pittwood describes drawing as a ‘backbone in



the realm of the visual arts’ (Pittwood 2012 Tracing the Century Review)

## 2. Background

Textile design, from a pedagogical and contemporary contextual viewpoint can be broadly defined:

‘A textile design is a piece of cloth made by weaving yarns spun from natural and artificial fibres. Whilst this process forms the textile, other processes contribute to its decorative and functional qualities. Principally these are printed textile design, where the cloth is printed and finishes are applied to it; and mixed media textile design, which includes embroidery and fabric manipulation.’ (Clark 2011 Textile Design:6)

At Loughborough drawing sits at the centre of the textile design curriculum linking into a vast range of thought processes, uses, outputs, artefacts, and products, developing fluency and competence during the 3 taught years of the programme, which encompasses a number of specialist pathway approaches: printed, woven and multi-media textiles. Drawing is taught but students are also expected to use drawing for many other aspects of project work, and at each stage of the design process, from sketchbook, through to the final design resolution and visualisation.

Drawing is often positioned as *the* common element in the art school curriculum, a transferrable skill, with great relevance in context, but historically there may have been a less strategic approach to developing a skill base aware of the contextual fit within textile design and the wider design industries.

Employment is a key driver in HE, For students paying to study and ultimately gain employment high marks and a highly competent portfolio become a priority, and as drawing skill is becoming a prerequisite for employment within the textiles sector this becomes an important issue. Textile design studios and major international design companies from high street to couture houses frequently list drawing ability as one of their key criteria for employment, in all areas of design from print to embroidery, knitting and weaving.

Drawing and Textiles are intrinsically linked in both the traditional and contemporary contexts: designing for textiles requires drawing competence and confidence, but more importantly an understanding of its application, its role and its purpose within the design process. Michael Kidner’s view is that ‘In a sense every drawing has a different method depending on what you are looking for from the

drawing’ (Eames 2008 Writing on Drawing)

It is also important to acknowledge that whilst describing the ability to draw well is difficult due to the evasive nature of a definition for drawing, as Deana Petherbridge describes:

‘Drawing, however seldom attracts consensus views. Instead it invites frustration or obsession in attempting to clarify something which is slippery and irresolute in its fluid status as performative act and idea; as sign, and symbol and signifier: as conceptual diagram as well as medium and process and technique with many uses, manifestations and applications’ (Petherbridge 2008 Writing on Drawing)

We can be more explicit about what drawing may be in the Textiles design and educational contexts. Drawing is a significant part of the creative process: design studios still frequently originate and develop ideas from a hand rendered, often paper base, methods of production might require detailed specification in diagrammatic form to communicate with producers, or hand rendered imagery which is then developed digitally to be sent around the world for volume production via digital means. The industry itself acknowledges the need for competency and demands good drawing skills from its employees as evidenced in some recent internship and job specifications: drawing is a core activity for makers and designers in Textiles

Steve Garner’s view summarises the relevance of drawing to our position:

‘Not only is it (drawing) seen as an appropriate means of designing a better solution or product but it is presented as profoundly affecting the process’ (Garner 1990 Journal of Art & Design Education)

Textiles fall largely into 2 categories: those which feature surface design, where design can be applied **to** (Print & Embroidery) the Textiles, or those which are constructed and where design features are embedded **within** the Textile material (Woven, Knitted), and drawing has an important if slightly different role in each case. In both cases drawing usually informs conceptual development, but may be more immediately visible in examples of surface design, where ‘drawn’ naturalistic representation is widely used.

In contemporary digital print and jacquard weaving a more direct relationship between drawing practice and textiles process is developing, due to the possibilities enabled by digital production capabilities: the emergence and increasingly widespread use of

these technologies can be seen to place drawing as central to the creative – and consequently the making process.

In this specific context drawing has a broad range of uses, Professor Pam Shenck has described the varied uses of drawing within the design process, and these descriptors can be applied to Textiles:

Drawing for accepting and giving instruction

Drawing for collecting visual reference material

Drawing for the initiation of ideas

Drawing for the development and refinement of ideas

Drawing for the synthesis and revision of design solutions

Drawing for communication

Drawing for presentation

Drawing for production (Schenk 2011 Developing a Taxonomy on Drawing for Design)

It is clear that drawing plays a substantial role in the design and development of contemporary textiles, and developing understanding of the role, purpose and application of drawing must therefore contribute significantly to the education of good practitioners.

## 3. Aims of the Research/Paper

‘Now and in recent times drawing is being actively rediscovered, not only in the academic context, but also in many artistic practices, as a vital material thinking process and as a distinctive artistic medium. The practice of drawing and the study of drawing practice are particularly interesting at present as a result of rapidly changing professional methods, the now ubiquitous forms of digital technologies and the fast pace of all these developments’.(Baksinger ndPencils before Pixels)

Given the rapidly changing professional and educational environments set against a background of fundamental changes within the Higher Education arena in the UK new agendas for learning and teaching are developing. This research responds to a range of factors including student attitudes and perceptions, sector requirements, employment opportunities, a changing resource base in education – staffing levels, studio space, facilities – and new research opportunities. Close scrutiny of the role of drawing within the programme is beginning to drive research, which ultimately prompts changes in teaching practice and

curriculum design.

This paper aims to consider the development of a contextually aware narrative thread for drawing within the studio practice elements of the Textiles: Innovation & Design programme at Loughborough University, whilst reflecting upon the importance of understanding the narrative and its relevance, and communicating this clearly to students. We must engage the students in their educational development balancing learning and teaching priorities and individual needs to establish a core of competencies relevant to future study or employment and align this with their expectations both of a good education and a job at the end.

Historically the taught drawing content largely consisted of life drawing, observational drawing, mark making exercises and fashion illustration. This content was often taught by fine artists, may have been taught as a core skill and did not generally align with textiles projects or particularly forge connections with textiles practice. Recently we have been considering and developing a more holistic approach identifying opportunities to embed the taught elements within studio projects to raise the students' awareness of the role and purpose for drawing within their individual practice. Students are arriving with a range of levels of confidence, skill and familiarity with the practice of drawing, but generally have been taught through traditional approaches to process with an emphasis on direct observation and conventions of representation.

The research presented reflects on recent student drawing project work, and evaluates the effectiveness of some of the taught drawing elements of the Textiles programme making recommendations for future pedagogical development. Examples of a number of projects designed to develop learning & teaching strategy, where drawing sits at the core of the work will be discussed. Specifically these projects were with Part A students, strategically placed within a wider design brief and designed to support the learning needs of a diverse group of individuals.

The research has the aim of testing and setting a new agenda, which will re-define the purpose of drawing within the programme and align teaching to clearly support the development of good design practice whilst establishing future directions clearly integrating drawing into taught projects. We consider drawing as a tool for learning (research, design systems - repeat, composition), communication, informing and shaping making, drawing for image and surface, making as drawing, its relationship to the materiality of textiles, drawing and the use of digital technologies and opportunities for multiple material outputs.

#### 4. Attitudes and Perceptions

Students are arriving on BA programmes less skilled and enthusiastic with regard to fundamental drawing skills: attitudes to drawing have changed in recent years, in part informed by the cultural context and the impact of digital media, and in part due to their prior educational experiences. It is widely perceived within the Fashion and Textiles HE sector, but also more broadly across the HE Art & Design sector that:

‘...competency in sketching and drawing by hand seems to be diminishing across design disciplines, making it a more highly desired skill in contemporary design practice. In addition, there seems to be an apparent phenomenon of fear when it comes to drawing ideas. For many practicing designers, they have convinced themselves that they can't draw and thus position themselves on the periphery of concept generation’ (Baskinger Pencils before Pixels )

Professor Pam Schenk says that

‘...drawing remains at the very centre of the creative and developmental process of design. In fact I have found that the low level of interest in drawing ability in today's' design students and new recruits to the design industry is a matter of serious concern to both design educators and professionals alike’ (Schenk A Letter from the Front Line)

In addition attitudes to drawing are often informed by years of school experience that expects annotation – writing about the drawing – for success; drawing is not seen as having the ability to communicate on its own terms. This practice is widely encouraged through school and also at FE level. Angela Anning describes that even in pre-school ‘drawing is not to be taken seriously by the adult as a communicative act’ (Anning 1999 Journal of Art & Design Education) At HE level we must we try to develop a more sophisticated way of communicating through visual means, where drawing is a ‘communicative act’ and non-verbal stories can develop in sketchbooks providing a visual dialogue for personal use.

Furthermore students have become accustomed to a saturation level of instantly available images with a high rate of turnover. Photo sharing websites sites such as Flickr, designer blogs, and sites such as Pinterest and Dribbble, function as research tools and negate the need for extensive library based individual investigation, or drawing to record the ideas base for any project – this instant access to images, information and ideas, encourages derivation, appropriation, and adaptation of pre-existing ideas and may be perceived to make traditional notions of drawing redundant. The ubiquitous use of photography to record everything is evident in student research for projects, often taking the

place of drawing. Further motives for change are informed by a diminishing understanding of materials and process. Students need to relate better to materials and making. We must encourage a move away from constant screen based activity, encouraging the use of drawing acting as a mediator between virtual and real in regard to design and making.

Looking and understanding, analysing, reflecting and observing, whilst developing competence and understanding of the behaviour of physical materials, are all necessary skills in the development of drawing competence and the visual language, underpinning the development of effective textile designers.

In the UK the traditional access route to degree courses in Art & Design has been via foundation and BTEC courses, which have acted as a bridge into Higher Education, and where there is a focus on drawing as a tool for exploring and developing ideas and creativity. The current educational climate with its inherent costs now means that more and more students are applying directly to HE courses without the benefit of this experience. Furthermore the question of art & design education is currently subject to much debate and drawing is central to this at all levels from primary education to HE. In school there has been a reduction of taught art sessions over the years, and the way these sessions are often taught has clearly had an impact. Angela Anning's paper on the development of children's drawing explains that:

‘At school children quickly learn that drawing has low status and that in school it involves learning a particular ‘house style’ of narrative/ representational conventions. Teachers do not model or explain the functions of different genres of drawing within different disciplines. In art lessons the name of the game is to make things look like things. Since their teachers do not teach drawing, children who are not ‘good’ at drawing soon abandon it as a mode of representing their ideas. Teachers rarely model drawing as a tool for problem solving, so children are unaware of its potential for helping them to learn. In school children retreat to the safety of a narrow and limited range of drawing behaviours preserving any interest in exploratory types of drawing for out of school settings.’ (Anning 1999 Journal of Art & Design Education)

The situation doesn't appear to be very much better at secondary school level in the UK. On the Ofsted website (OFSTED 2011/12 Case Study Reports) there are a number of reports and case studies of good practice in art in schools, it is interesting, if not a cause for considerable concern that out of 7 papers only one mentions drawing briefly. A head of art in a school in Leeds explained her

frustration with the current Art & Design syllabus:

‘Up to key stage 4 the students have just 1 timetabled hour of Art per week which must include all aspects of the subject, not just drawing. The drive for results doesn’t appear to value either drawing or creativity, and the pressure to plan all lessons will not allow for the spontaneity sometimes necessary to develop individual approaches to nurturing drawing skill. The situation improves at GCSE level where around 2 and a half hours a week is allocated, but since it is possible to achieve a reasonable GCSE grade with minimal original drawing in some schools it is barely on the agenda. The kids want to draw, and develop their skills, and respond well to the examples of good practice they are shown by external visitors, but the development of skill has always to be supported by understanding of context which takes time is easier to do, and evaluate’ (2013)

In Textiles teaching within Higher Education we seem to be dealing with an interesting set of circumstances: drawing is useful, applicable, and necessary in the pursuit of good design. ‘Newness’ and innovation, often driven and underpinned by experimental drawing are required by the industry but the skill base and attitude of students requires attention. Drawing cannot necessarily be expected as an extant skill, or a priority for new students keen to get on with textiles making as soon as possible, and they are often ill informed about innovations on the traditional notions of drawing. There is a fundamental tension between what a student might have come to understand as good drawing and the educational expectation of purposeful drawing.

##### 5. Developing a new agenda

Angela Anning describes 2 key concepts in the education of young children, of ‘learning to draw and drawing to learn’ (Anning 1999 Journal of Art & Design Education). The models she describes provide a useful framework in which to consider this research. In the HE context learning to draw means challenging some prior behaviours to develop an understanding of what drawing actually is and why it is important, and then drawing to learn describes the value of drawing as a highly effective tool for developing and embedding knowledge.

Within the Textiles programme at Loughborough staff are looking at what, why and how we teach - aiming to change perceptions and develop a more focused drawing attitude in this generation of students. - changing their way of thinking about drawing and also their way of doing drawing with a purpose and for a purpose mindful of textiles specifics. It’s not now just a case of getting better at

drawing by doing, practice, but using methods of direct intervention via strategic projects to flag up and impart knowledge of particular issues.

Students are expected to use drawing for many aspects of project work. Taught sessions develop around specific textiles related tasks, for example they may focus on drawing for composition, for making and process, mark making and scale, observation, colour, repetition etc. From time to time we also encourage quick responses and development of briefs to mirror studio activity and responding to the market demands for new ideas. Drawing is linked to IT, workshop and making activity and the visualisation of conclusions.

Through research and in discussion with the Textiles staff team, colleagues involved in other design programmes and industry contacts we have identified a number of key objectives in developing the drawing agenda. For first year students, we have created a number of pilot projects to address identified issues. We can evaluate the effectiveness of these projects via the assessment mechanism and student feedback to module content.

The projects we developed cover a number of differing aspects of the above criteria and range from simple mark making, though exercises in composition and scale, exploration of media and making process, concept development, to projects directed towards digital output, and were designed with the following criteria in mind:

- Build confidence
- Develop practical skill
- Consider awareness and understanding of contextual fit
- Connect with individuals’ design practice
- Embed within design practice
- A tool for learning about process and methodology
- Link into making and construction
- Informed by staff textiles practice
- Informed by staff research

##### 6. Projects

###### *Project Series1: process journey*

Drawings for textiles are usually subject to a range of processes in preparation for a final outcome, and this may include conversion to digital form, separation and layering in preparation for screen printing, changes of scale and development of repeat so that they can be applied to continuous lengths of textiles materials. The focus of the first drawing project that the students encounter is essentially a simple mark-making exercise with the emphasis on the journey, and stages and changes made to the drawings, mimicking textile process, rather than on whether the students are achieving a ‘good’ drawing or not.

There is sub text to the project that students are less explicitly aware of: we have a number of issues to address through the learning experience that are not about teaching drawing but overcoming a range of attitudes and ideas. Through school students are taught to ‘make thing look like things’: drawing as representation seems to be ingrained and yet their own perceived inability to achieve this style of drawing may often contribute to the fear factor, generated by inappropriate expectation, and lack of experience. Students will often say ‘I’m no good at drawing’ or demonstrate levels of fear and reluctance to the idea of drawing in a public. This may be because they see a formality and degree of finish attached to the notion of drawing but will accept and expect much less from a mark-making and sketching exercise.

The project work is designed to develop aspects of play, experimentation and innovation, whilst challenging pre-conceptions that may have developed. Teaching is delivered by textiles practitioners constantly encouraging and developing the dialogue between the drawing activity and design outcomes so that they understand that their drawing has purpose as part of a sequence of activity, and is a means to an end.

The students are encouraged to experiment with media, and to ‘break a few rules’: there are a surprising number of inherited ideas which often inhibit true exploration. For example, students may have been told not to draw on certain weights and colours of paper, not to use certain media, or to create a realistic literal interpretation of the subject. This project encourages them to make work quickly, generating lots of variation and with an open ended approach, providing a good opportunity to encourage risk taking approaches, and to try to capture a spirit of experimentation and investigation, leading to more innovative design outcomes. The project links into some introductory IT sessions which

develop this approach and process further. It is also important that students understand the relationship of their drawing experiments to their design practice and so this work synchronises with a set studio project theme, and they are encouraged to explore their ideas within a mark making agenda

By working in a communal studio space, within a large group, communicating and sharing ideas, and with a simple project we are aiming to develop a degree of confidence in image making and beginning to overcome the fear that students often describe when working in group situations, and with unfamiliar people.

The end results achieved by this project are often surprisingly sophisticated in design terms, given the lack of experience and limitations of knowledge.

*Project Series 2: Composition & Observation*

With the 'phone as sketchbook, image store and recording device it is often difficult to encourage first year students to engage with real objects for observational drawing purposes, and to spend appreciable amounts of time doing so. Underlying issues emerging from recent student projects seem to relate to commitment to time: one of the most commonly heard phrases in the studio, and during crits is 'it took me ages': the fast image generation needs quick results, and developing a new drawing attitude has become something of an imperative, to help them appreciate the value of taking time and attending to detail where it is necessary to create successful design outcomes.

Students often find it difficult to make the transition from a body of drawing work to understanding its application within a textiles design context – they simply can't always comprehend the differences. This may be addressed through drawing exercises which deal with the textiles specifics, using drawing to visualise, but also to understand ideas for scale, composition, repeat and application to product. If this is initially taught through drawing the focus becomes less about the production of samples, products, and prototypes and more about understanding what they are learning.

Observation forms the basis of the project work, but the development of a personal narrative and viewpoint is encouraged with much less attention to ideas of accurate representation, all wrapped into an agenda exploring approaches to composition, repeat systems and the developing appreciation of scale within the textiles context. Drawing, re-drawing, copying, shrinking, enlarging, exploration of layout

options, use of repeating or multiple images are all explored. The drawing work links into studio project work which requires finished paper based textile designs as its conclusion, for a clearly defined context – fashion or Interiors – which will impact on their consideration of scale.

During a recent project students responded with reluctance to the idea of a drawing based workshop to expand and develop the concept of putting a design into repeat – after all this is a very straight forward operation on a computer. However on completion of the work they were unanimous in the view that they understood the concept far better and were very excited by the results and potential for his application of their ideas. Their experience

of doing drawing means we are developing better student perception of the correlation between time spent and the learning experience – what are you learning from this as much as what is the result, with less of a focus on finished designs.

Drawing in this way also forms a solid base for the communication of ideas, and the sharing of the educational experience, which is much more difficult to replicate where lap tops and other digital means may be used. The fluency of the visual language that develops during the year enables a more sophisticated level of discussion and deeper understanding.

*Project Series 3: Transition*

Current textiles teaching in the UK appears to promote a formalistic progression from drawing to design, where initial drawing is frequently translated onto or into textile media. The most challenging and interesting part of the research process has been the consideration of drawing and its relationship with construction - how and why might you approach drawing for constructed textiles, where figurative or drawn content in design is very much less evident, and qualities of surface, and colour and texture effects are more prominent. This is particularly pertinent where we are considering textiles whose construction process informs the aesthetic qualities of the design, and are not surface effects added after. An experienced practitioner with a strong grasp of process and material behaviour can approach the making process as a drawing activity, and work directly with the materials and with less need for extensive pre-planning but for those with less expertise drawing can act as a bridge into understanding approaches to materials and making, but also importantly as a communication tool to mediate in learning dialogue around process and technical support.

Drawing is widely used for specification and notation, creating plans

and instructions, which are then re-created within the limitations of the particular equipment, process or structure. It may be useful to develop this approach to encourage a back to basics materials led approach to drawing subverting some commonly accepted practices and creating a more direct link with making practices. De Freitas says that:

'Bolt's discussion of the material conditions of drawing practice remind us that the process is a physical one that involves engagement with ideas, materials and tools all of which contribute significantly to the outcome'.  
(De Freitas 2010 Studies in Material Thinking)

This series of projects explores the relationships between drawing, materials and construction, and considers drawing activity as a bridge into materiality and making. The students are encouraged to draw making use of thread, stitch, simple construction techniques and tapes, adhesives and textured and 3 dimensional and layered surfaces, exploring connections between line, thread, object and process, and construction of textile materials. Fundamental to the approach is the role of a subject for observation – the students work from objects creating drawings in response directly with textiles media. This contributes to a developing understanding of textiles process but may also push the boundaries of those processes. By encouraging a greater dialogue between the making and drawing processes allowing ideas to develop in a direct linear manner rather than using drawing as a spate activity that is then translated, we can begin to see some interesting results.

The underlying project narrative encourages student to convey meaning through material, and the drawing workshops are delivered within the context of a materials and construction design project, making use of stitch, knitting and simple construction processes, and with some making taking place in direct response to the observed subject matter.

The related textile design project brief appeared to have more innovative content due to this approach, and the concept will be further explored in future projects. There is significant potential to develop this work further, so that the 2 activities of drawing and making become entirely interchangeable, exploring and blurring the boundaries between 2 perceived locations - paper, drawing, studio space, and yarn, thread, machinery, workshop space.

Throughout this first year of the programme we are continuously aiming to develop a strong individual confidence in image making, challenging notions of what drawing actually is and what it's purpose is within individual's practice, whilst engaging with specific textile design activity.

For the remainder of the programme drawing continues to be fundamental to good practice, and the evidence is present throughout student projects and portfolios, it's role and purpose changing to suit individual approaches. A high degree of confidence and autonomy established in the first year provides a strong foundation to develop from.

#### 7. Conclusions

The Learning and Teaching agenda for drawing in Textile Design education is changing, and we must continually review and re-evaluate its role and function within a contemporary Textiles education. The format and relevance of teaching drawing, and the cultivation of an agenda that supports its active use, should be a matter of continuous review in order to address student expectation and contextual fit.

We seem increasingly to be playing catch up with the first year students; there are gaps in their prior education, that need addressing, and a very broad range of ability levels. International students, bring a very different cultural perspective, expectations of drawing, skill and ability are different and may have been taught in a very different way.

There are certainly areas with potential for further exploration and consideration. Materiality, drawing shaping making, investigation of the ideas around translation, encouragement of a more direct approach exploring material content particularly where construction is inherent within the textile production, and the relationship of the studio space and the workshops are interesting areas for future research. As practitioners we are approaching these questions through the development of our own practice.

This on-going research has the aim of testing and setting a new agenda, re-defining the purpose of drawing and aligning teaching to clearly support the development of good design practice and clearly integrating drawing into taught projects.

In summary we are aiming to encourage students to make less value judgement, not to be concerned about whether they are good or bad at drawing, but to take a more strategic and critical view of their own practice, to understand how useful and necessary this method of working might be, within the textiles context. The developing narrative can be re-enforced and developed by research around drawing teaching, and the joining up of practice, research and pedagogy. On the Textiles: Innovation & Design programme at Loughborough we are committed to developing drawing in context, teaching skills rather than expecting competence and placing drawing at the core of a curriculum which takes

account of the needs of a contemporary art & design world.

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# KESKIN *et al.* | DRAWING AS AN INTERVENTION FOR COGNITIVE AND THEORY OF MIND DEVELOPMENT

## An Intervention for Improving Cognitive and Theory of Mind Development of Children Using Drawing as a Step between Performance and

### Abstract

An intervention was held on 42 children of whom 30 (71.4%) were boys and 12 (28.6%) were girls in the mental ages between 3 to 6 years and with a developmental delay  $\geq 1$  year. It provided the children with activities associating their senses with their acts and also the objects and body parts of their own and/or of child-sized dolls aiming at the hypothesized gains of the coordination of the previous ages of 0 to 3 years. The intervention included one-hour-long sessions held once a week for 8 consecutive weeks. At each session, the children were encouraged to “draw a person.” The post-intervention Koppitz’ Developmental Indicators and “Draw a Person” scores showed significant improvements. The results were also significant when compared with that of those drawings done at a 2-month-interval by the mental age-equivalent control group with a developmental delay  $\geq 1$  year ( $n=26$ ) but had no intervention. Moreover, the post-intervention theory of mind and cognitive task scores showed considerable improvements, especially on recognizing the self (78.6%), and human face and body parts (76.2%), planning acts (56.1), understanding gestures (53.7%), and false belief (46.3%). Although, the comparison of the results of the intervention and control groups on almost all theory of mind and cognitive tasks was significant, tasks on manipulating others showed a comparatively slow rate of improvement, such as; keeping secret (24.4%), denying actions (24.4%), convincing (25%), empathy (25%), and hiding emotions and thoughts (22%). The space understanding (23.8%) showed a slower rate than that of time (39%). Of the cognitive tasks, 58.5% of the children passed the post-intervention memory and 46.3% did the attention tests. The least improved task was the working memory (14.6%). In conclusion, an induction in drawing and also the concurrently developing

theory of mind and cognitive functions in the pre-operational stage was achieved by activating the gains of the previous sensory-motor stage.

Key words Children’s drawings, intervention, execution, theory of mind, mental retardation

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### DRAWING AS AN INTERVENTION

An Intervention for Improving Cognitive and Theory of Mind Development of Children Using Drawing as a Step between Performance and Understanding

Humans rely on their capacity for attention through their sensory systems to identify the world. The state of consciousness also necessitates an understanding of the relation between the self and environment (Welsh & Pennington, 1988; Carruthers, 1996). This is achieved by a complex set of cerebral processes, the end product of which decouples the reality and representation. Drawing, however, seemingly realizes representation back to reality.

The act of drawing by itself, is a complex sensory-motor task involving not only visual, but also somato-sensory feed-back. The visual receptive areas are sensitive to shades, edges, and contours. Yet, visual perception is global and unified. This transformation requires grouping processes by which, local features have to be assigned to a particular figure (Marr, 1982). Neuro-imaging studies show that subdivisions of the occipito-temporal cortex have segregations according to specific object categories (Lamme, 1995; Zipser, Lamme, & Schiller, 1996; Lee, Mumford, Romero, & Lamme, 1998; Zhou, Friedman, & Von der Heydt, 2000). Indeed, the children’s visual-motor function development has extensively driven the attention of the scholars (Bender, 1938; Lowenfeld, 1947). The accordingly designed Bender-Gestalt visual-

motor integration test has best served to follow up the trajectories of the development of sensory reception, perception, and fine motor activity of the children showing a normal development, as well as those with a developmental delay (Bender, 1938; Hutt, 1945, 1969, 1977; Billingslea, 1948; Machover, 1949; Kitay, 1950; Pascal-Suttel, 1951; Peek & Quast, 1951; Keller, 1955; Koppitz, 1975; Keogh & Smith, 1967; McCarthy, 1975; Wallbrown, Wallbrown, & Engin, 1976).

The transformation of the early single components (smallest-undivided and spatially-independent) that emerge as partial-wholes which, when integrated into a whole, would lose their status of being a partial-wholes but become sub-units (Goodenough, 1926; Goodenough & Harris, 1950; Heckhausen, 1961). This change of Gestalt-theoretical approach (Kellogg, 1970) is conceptualized as operative conservation by the developmental theorists (Willats, 1977, 1997; Piaget & Inhelder, 1967; Morra, 1995, 2005). Along with development, the early combination principle of shapes re-emerges, but with the activation of higher order mental operations and they show more sophistication (Lange-Kuttner, Kerzmann, & Heckhausen, 2002). That is, each developmental step presents with a consistent trajectory in itself. At an early developmental stage for example, the head shows a realistically contoured profile, yet the body would not have an equivalent rate of details. Even talented young artists are likely to represent spatial axes in a way typical of their chronological age, although their drawings of each figure may be beautifully detailed and realistic (Case, Stephenson, Bleiker, & Okamoto, 1996). That is, the visual-motor abilities are almost mature at a time when visual-perceptual capacities just begin to develop.

In short, the human figure undergoes an autonomous, and perhaps universal developmental differentiation with an increase in the number of the items it contains, their reality equivalent proportions, and the quality of the lines (Tepecik & Oguzoglu, 2002; Plubrukarn & Theeramanoparp, 2003; Daglioglu & Cakir, 2010). If drawing were dependent on the mere increase of one component, such as the working memory as one central part of information processing capacity, or fine motor skills in the manual activity, then its developmental trajectory would have shown a linear increase (Charman & Baron-Cohen, 1992). Furthermore, the researchers from diverse theoretical perspectives agree on that drawing involves a cross-modal mental processing. In fact, children’s drawings have been put through a large range of objective and projective uses, such as development (Swenson, 1957), intellect (Goodenough, 1926; Machover, 1949; Koppitz, 1975; Harris, 1963; Ilg, Ames, Keskin *et al.*, Drawing & Cognition, Haines, & Gillespie, 1978), and

self-concept (Prytula, Phelps, Morrissey, & Davis, 1978). Consequently, there is a body of literature on the reliability and validity of the scoring systems designed to evaluate children's drawings appropriate for mental age (Achover, 1949; Harris, 1963; Keogh & Smith, 1967; McCarthy, 1975; Wallbrown et. al., 1976; Engin & Wallbrown, 1980; Plubrukarn & Theeramanoparp, 2003).

The operative counterpart of the intelligence follows the transformations of the objects, in shape, size, and/or in time or space. The figurative part, however, involves all means of representation retained in mind that intervene between changes. Drawing is among the means of the figurative intelligence that involves perception and mental imagery. Thus, the representative part determines the extent of the operative processing, and vice versa. That is, the cross-modal coordination of the mental operations shows a global distribution within the brain (McLean & Hitch, 1999; Müller, Sokol, & Overton, 1999).

The adaptation, however, could only be possible after being able to differentiate the object self from the environment (Leslie, 1987; Hughes, 1998; Wellman, 2002; Call & Tomasello, 2008). The understanding of the self as an identity and other's internal states, on the other hand, necessitates the ability to theorize about one's own and other's minds. A key debate in the existing literature concerns the degree to which theory of mind (ToM) depends upon specialized processes devoted to only the purpose of ToM computations (domain specific processes) or upon globally active operations that also serve other cognitive functions (domain-general processes) (Perner, 1991; Davis & Pratt, 1995; Gordon & Olson, 1998; Müller, Zelazo, & Imrisek, 2005; Sabbagh, Moses, & Schiverick, 2006). This query brings about the proposals in that, may the training on one account of a cross-modal function, would lead to enhancement on other accounts, and vice versa (Perner & Lang, 1999).

#### **Developmental Gains in Children's Drawings**

By the age of three, the children start drawing figures resembling a tadpole which apparently represent the human head, and extensions of the body. These object-resembling figures usually appear following those of irregular line segments (Kellogg, 1969). Although these segments do not resemble any objects, they seemingly are mental representations, since the child is eager to express what s/he has drawn. Furthermore, these segments show a relatively controlled nature compared to the endless lines of scribbling of the preceding stage. At a closer look, these line segments also differ in themselves, such as the ones with a dot at the start, and those without (Keskin, 2003). This heavy start clearly

indicates the relatively rigorous touch of the pencil down on the paper, most probably due to the insufficiency in the eye-hand coordination. The transition from the pre-schematic to schematic stage (Lowenfeld, 1947) signifies the end of the sensory-motor stage of the ages between 0 to 3 years, and the start of the pre-operational stage of the succeeding three years (Piaget & Garcia, 1991).

The understanding of the sequential details in the developmental gains encourages also a debate on the nurturing effect of an enriched environment. It is theoretically possible that a developmental step may be induced, within certain limits, if the demands of the previous stage were well satisfied. In the "sticky mittens" experiment, for example, it was observed that the early reaching experiences shape infants' motor development and their perception of actions performed by others and thus, motor training can jump-start infants' transition into a next developmental stage (Needham, 2000; Libertus & Needham, 2010).

#### **Hypothesis**

If it is a fact that the children's drawings show a time-set and step-wise improvement, then those concurrent domain-general mental operations pertaining to the process of drawing are expected to be sequentially active. It is also a fact that the building up of the prospective grounds of the representative content takes start as early as the 6 weeks of life with the activation of basically two operations namely, the assimilation and accommodation (Piaget & Garcia, 1991; Suddendorf, 2003). Then, would it influence the concurrently developing domain-specific functions, if the in-step domain-general operations were induced? Thus, we hypothesized that if a child in the pre-operational stage was provided with activities as they were in the sequential order of the gains of the previous sensory-motor stage for a relatively short period of time, not enough to naturalistically gain a further step, then this would improve his/her drawings. We also hypothesized that a further step gain in drawing activity would indicate an increase in the representative content, and not a passive improvement in the mere act of drawing, if there also appeared improvements in the concurrently evolving functions such as, ToM and execution.

#### **Method**

To test our hypothesis, we designed a prospective intervention on developmentally delayed children with a mental age of the pre-operational stage, but with no motor dysfunction rendering the act of drawing. The intervention included one-hour-long sessions held once a week for 8 consecutive weeks. The trainer designed activities aiming to associate

the child's senses with her/his acts on the sizes, shapes, contours, and spatial organizations of the objects and human body parts. The effect of the intervention was rated with pre- and post-intervention tests on the general development, ToM, and cognitive functions, as well as, those scoring systems on children's drawings of a person.

#### **Participants**

92 children between the ages of 3 to 14 years but with a mental age between 3 to 6 years either in accordance with or  $\geq 1$  year below their chronological ages, were included in this prospective study held at a counseling center for both normally developing and retarded children between May 2012 and July 2013. Those with a delay were randomly included in either the intervention (group 1) ( $n=42$ ) or control (group 2) ( $n=26$ ) groups. Those showing an age-equivalent development were placed in the placebo group ( $n=24$ ). All children were assessed with the following developmental tests at a two-month-interval, a time period equivalent to the intervention: the Ankara Developmental Screening Inventory (ADSI), The Bender-Gestalt visual-motor integration test, the Theory of Mind tasks, age-equivalent cognitive function tests, the Koppit, Aöz Developmental Indicators (KDI), and "Draw a Person" task (DAP). Only group 1 was provided with an intervention which consisted of one-hour-long sessions per week held for 8 consecutive weeks. The children were enrolled into the study with a written consent of the parents. There occurred resignations mostly due to transportation difficulties, but there were no drop-outs after the start of the intervention.

#### **Measures**

##### *The Ankara Developmental Screening Inventory (ADSI)*

This is an equivalent of DENVER with a consistency of 0.80-0.99. It has 154 items, screening the development in the language-cognitive, fine- and gross-motor, and social skill-self care domains. The correlation coefficient is 0.92, 0.96, and 0.90 for normally developing, premature, and mentally retarded children, respectively (Savasir, Sezgin, & Erol, 1998).

##### *The Childhood Autism Rating Scale (CARS)*

This 15-item-scale assesses inter-personal social behaviors and is used to identify children with autism. The test rates such behaviors as; the relating to people, imitation, emotional responses, gesture use, object use, adaptation to change, eye-contact, receptive and perceptive responsiveness, fear or anxiety, verbal and non-verbal communication, activity level, and intellect. The scores are inversely proportional with

the quality of social interactions and the scorers with >30 within the 0 - 60 range of the test, are diagnosed as autistic (Schopler, Reichler, DeVellis, & Daly, 1980).

#### *The Theory of Mind (ToM) Tasks*

To our knowledge, there has not yet appeared any structured test to evaluate the ToM development of children. Thus, we referred to the tasks designed to assess the ToM functioning, in the order of their appearance as such; the defining of objects, self- understanding, differentiating appearance from reality, understanding other's internal states, and manipulating others.

#### *The Cognitive Function tests*

The cognitive development of the children was assessed with the age-equivalent measures such as; the Frankfurter's attention test, digit span test (an indicator of memory), reverse digit span test (for evaluating the working memory) and tasks on the categorization, affirmation, and negation.

#### *The Bender-Gestalt Visual-Motor Integration Test*

This is commonly used to assess the cognitive development of preschool children consisting of nine cards each displaying a unique figure. The child copies each figure as s/he observes it. The score is based on the 30 possible errors as such; distortion, rotation, failure to integrate, and perseverance. The test reliability is .50 to .84 (Koppitz, 1975), and the inter-rater reliability is .79 to .97 (Sattler, 2002).

#### *The Koppitz's Human Figure Drawing Scoring System*

The Koppitz's Developmental Indicators (KDI) (1968) were developed to score the Goodenough-Harris, "draw of a person (DAP)" task according to the number of items expected to appear accordingly with the mental age, and as well as of those unexpected items. The inter-rater reliability exceeded 0.90 (Koppitz, 1968; Rae & Hyland, 2001).

#### *The Intervention*

The intervention was implemented by a physio-therapist who was experienced in training the disabled children. The setting was a plain and neat room not to drive the attention of the child other than the training activities. It had a set of a table and two comfortable stools, one for the trainer and one for the child. The training materials involved toys in several categories such as: play-dough, crayons, and papers with different colors and textures, interlocking game materials of variable

sizes, ropes of several lengths, wood-sticks and wood blocks of several dimensions, a trampoline, a sand pool, and the like. The body parts were made available to the touch of the child, on the child sized-dolls with separate fingers and prominent necks, and also made up of material as much resembling as the skin of the human. The Southern California Sensory Integration Test material was referred to improve and test the level of perception (Kimball, 1990).

The aim of the first 2 sessions was to coordinate the senses with the acts and objects (the secondary circular reactions). The child was encouraged to walk, run, jump, creep, crawl, tiptoe, walk on the heels, walk on four extremities, do handstand on several grounds with hard, soft, pebbled, wet, warm, and/or cold textures. The child was encouraged to feel by using as much of his senses as possible, the parts or wholes of the objects with similar and/or contrasting details. The trainer encouraged the child to make guesses, verbally or non-verbally, on the objects he sensed. The third session was devoted to categorizing objects according to their particulars (the assimilation and accommodation). The fourth session was aimed to recall the object parts or wholes of the previous session upon the introduction of the associated sensations (the object constancy). In the fifth session, the trainer and the child played an organized game with toys. When the game was over, the trainer encouraged the child to re-start the game but this time she provided the child with missing and/or irrelevant items. The necessary items, however, were placed among a pile of unnecessary stuff at the sight, but not at an easy reach of the child. The trainer ensured him that she would give him any item in case s/he needed it (the cause-effect relations). In the next session, the play setting was similar, but this time the trainer encouraged the child to reach the necessary item(s) with an agent around, such as a key, stick, rope, ladder of several sizes, etc. (the tertiary circular reactions). In the seventh session a game was set with toys of several sizes during which the trainer encouraged the child to choose those appropriate for size, and put them in the order of their real counterparts, such as; the car in the garage, the refrigerator in the kitchen, etc.. The trainer changed rotations, positions, angles, and curves of the items right after the child had placed them, and had him to put the items back into their initial positions (the object relations). The eighth session dealt with the activities designed to use the senses at identifying macro- and micro-dimensional objects, such as edges, corners, curves, closures, continuities, and proximities. The child was encouraged to place himself or an object small or large; up, over, under, near, close, within, or out of the lines, circles, dots, or steps made of ropes, sticks or lines drawn on the floor (the internalization). The last

15 minutes of each session were spared for the child to draw freely a person on a piece of white plain A4 paper using a pencil. The trainer drew the attention of the child to body parts by having him to notice and touch the body parts of the dolls and/or the child's own. A mirror was used to enrich the sense of vision.

The psychologists were provided with the supervision from an experienced clinical psychologist and they were certificated to apply all the tests used in this study. During the supervision, the assessors, assessment and counseling practices were reviewed in order to maintain a high standard of integrity and to ensure that each assessor was adhering to all guidelines for the participant contact (e.g. the length and content of the intervention sessions, and adhering to templates).

#### *Statistical analyses*

The SPSS 16 package program was used for the analyses. The independent samples t-test was used to compare the differences between the post- and pre-task results of the intervention and control groups. The subscales of the screening tests were separately compared by the SPANOVA for the statistical analyses of the pre- and post-test scores of the intervention group. The level of >0.05 indicated the meaningfulness.

#### *Results*

##### *The intervention group analyses*

There included 42 children in group 1 of whom 71.4% (n=30) were boys and 28.6% (n=12) were girls (table 1).

Table 1 *Gender characteristics of the intervention group.*

Gender	f	%
Female	12	28.6
Male	30	71.4
Total	42	100.0

Table 2 shows that a significant rate of improvement was seen in the post-ToM task results with the most developed abilities were the self-recognition (78.6%) and recognizing of human face parts (76.2%). Other ToM tasks which showed a considerable rate of improvement were as follows: the planning of acts (56.1%), understanding of gestures (53.7%), understanding of the false belief (46.3%), making surprise,



joking (41.5%), matching emotions and thoughts with acts (39%), understanding own and other's wishes (38.1%), and role-playing (36.6%). The least rate of improvement, on the other hand, was seen in the tasks of the understanding of the reasons of acts (29.3%), and in those of the manipulating others, such as; the keeping secret (24.4%), denying (24.4%), convincing (25%), empathy making (25%), and hiding emotions and thoughts (22%). The understanding of the space (23.8%) showed a slower rate of improvement when compared to that of time

Table 2 Improvement in the post-intervention Theory of Mind Task results

Theory of mind tasks	f	%
Naming and recognizing the human face parts	32	76.2
Eye contact and imitation	10	23.8
Self-recognition	33	78.6
Recognizing by the face	12	28.6
Place recognition	10	23.8
Object relations	12	28.6
Object recognition	15	35.7
Understanding own and other's wishes	16	38.1
Understanding the reasons of acts	12	29.3
Differentiating reality from play	12	29.3
Planning acts on cause-effect relation	23	56.1
Recognizing and naming the colors' spectrum	14	34.1
Guessing with the 5 senses	14	34.1
Understanding facial expressions	11	26.8
Matching emotions and thoughts with acts	16	39.0
Understanding other's gestures	22	53.7
Understanding of time	16	39.0
Hiding emotions and thoughts	9	22.0
Guessing emotions and thoughts	11	26.8
Differentiating fake and real acts	10	24.4
Making surprise, joking	17	41.5
Keeping secret	10	24.4
Understanding false belief	19	46.3

Empathy making	10	25.0
Convincing	10	25.0
Guessing other's emotions and thoughts	11	26.8
Denying actions	10	24.4
Role playing	15	36.6

(39%).

Table 3 indicates that there was a significant rate of improvement in the post-intervention cognitive task results. 24 (58.5%) children improved in the post-intervention digit span task, an indicator of the memory and 19 (46.3%) children in the post-Frankfurter Attention test. The tasks on the categorization and affirmation, both of which involved the operation of assimilation and had a unary relational complexity, showed an equal rate of improvement with 31.7%. Tasks on the negation which were of a tertiary relational complexity, on the other hand, showed a comparatively slow rate of improvement (23.8%). The least rate of improvement was seen in the post-intervention reverse digit span task, which assessed the working memory (14.6%).

Table 3 Improvement in the post-intervention Cognitive Task scores

The cognitive tasks	f	%
Direct digit span	24	58.5
Reverse digit span	6	14.6
Categorization	13	31.7
Affirmation	13	31.7
Negation	10	23.8
The Frankfurter's Attention Test	19	46.3

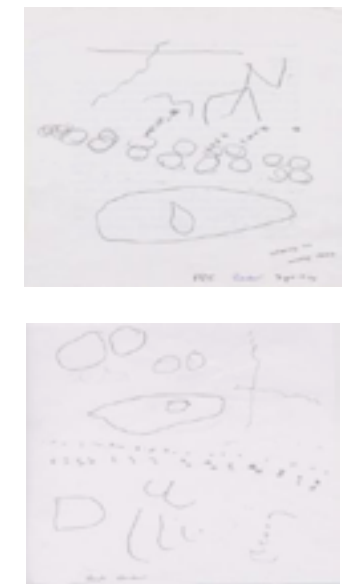
There occurred a considerable rate of improvement (71.4%) in the post-Bender-Gestalt visual-motor integration test scores of group 1 (table 4). Figure 1 shows an example of an improvement in the visual-motor integration in one of the children following the intervention.

Table 4 Improvement in the post-intervention Bender-Gestalt scores

IQ Test	F	%
Bender-Gestalt	30	71.4

Figures 1 to 3

Figure 1. A sample of Bender-Gestalt test from group 1.



There was also a significant improvement in the post-ADSI scores after the intervention  $-t(41) = 6.04, p < .05$  which was equivalent to  $\geq 10$  months of increase in the gain of developmental milestones of all areas such as; the fine and gross motor, language, and social interaction (table 5).

Table 5 Pre- & post-intervention ADSI results for all areas of development

	N	M	SEM	Sd.	T	p
Pre-ADSI	40	56,9750	22,57			
Post-ADSI	40	66,5750	19,95	39	-6,038	.000*

\* $p < .05$

There were no gender differences in the pre-ADSI scores of group 1, and the intervention did not show any difference between genders in terms of the rate of improvement as seen in the post-ADSI scores in

Table 6 Gender difference in the pre-intervention ADSI

Sex	N	M	SEM	Sd.	T	p
Female	12	68,3333	7,91			
Male	29	65,7931	22,98	39	.371	.156

\* $p < .05$

tables 6 and 7.

Table 6 Gender difference in the pre-intervention ADSI

Sex	N	M	SEM	Sd.	T	p
Female	12	68,3333	7,91	39	.371	.156
Male	29	65,7931	22,98			

\*p<.05

Table 7 Gender effect of the intervention on the ADSI

Sex	N	M	SEM	Sd.	T	p
Female	12	58,9167	12,47	39	.371	.253
Male	29	55,8621	25,47			

\*p<.05

Group 1 was also homogenous between genders in terms of the pre-intervention CARS scores (table 8), and the intervention did not have any gender effect on the rate of improvement in the CARS scores (table 9). Table 10 indicates that there was a significant decrease in the CARS scores after the intervention  $-t(37) = 6.04, p<.05$ . This finding was consistent with the improvement in the ToM tasks.

Table 11 displays that there was a significant improvement in the DAP

Table 8 Gender difference in the pre-intervention CARS scores of social interaction

Sex	N	M	SEM	SD	T	p
Female	12	26.8333	7.33	36	.639	.527
Male	26	24.6731	10.57			

p<.05

Table 9 Gender effect of the intervention on the CARS scores of social interaction

Sex	N	M	SEM	SD.	T	p
Female	12	23.0833	6.02	36	.42	.677
Male	29	22.3103	5.08			

Table 10 Pre- & post-intervention CARS scores of social interaction

	N	M	SEM	SD.	T	p
Pre-CARS	25.3553	38	9.62	39	-6,038	.000*
Post-CARS	22.3553	38	5.40			

\*p<.05

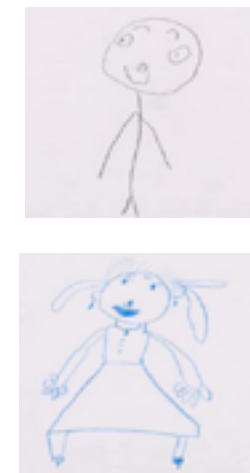
scores after the intervention  $-t(41) = 13.74, p<.05$ . The children’s drawings followed up a consistently built-up improvement at each session. The children, who were at the early schematic level with irregular line segments, drew a person with a face and 1-D body with its extensions following the intervention. Those in the level of a “tad-pole” were able to draw a 2-D person showing details both of the face and body such as; the eye-lashes, neck, palms, and feet (figure 2).

Table 11 Pre- & post-intervention DAP scores

	N	M	SEM	SD.	T	p
Pre-DAP	39	3.7692	.21	2.1	-13.74	.000*
Post-DAP	39	8.3846	.32			

\*p<.05

Figure 2. A sample of DAP task from group 1.



There was a significant improvement in the KDI scores  $-t(41) = 15.21, p<.05$  (table 12). The children whose pre-intervention KDI scores were “extremely and/or moderately delayed” scored “average and/or high average” following the intervention.

The comparison of the results of developmental screening done at 2

Table 12 Pre- & post-intervention KDI scores

	N	M	SEM	SD.	T	p
Pre-KDI	42	1.2143	.19	1.5	-15.21	.000*
Post-KDI	42	4.7381	.19			

\*p<.05

months interval of the Intervention and Control Groups

The independent samples t-test was used to obtain the differences between the post- and pre-ToM task results, where the differences were strongly significant for group 1, whereas they were not meaningful for group 2 (table 13).

Table 13 Comparison of the post- & pre-TOM task scores of groups 1 and 2

Theory of Mind Items	N	M	df	t	p
<i>Understanding own and other’s wishes</i>					
Intervention	41	.39	64	2.31	.02*
Control	25	.12			
<i>Planning acts on cause-effect relation</i>					
Intervention	41	.54	64	3.88	.00*
Control	25	.08			
<i>Recognizing and naming the color’s spectrum</i>					
Intervention	41	.32	64	2.88	.02*
Control	25	.32			
<i>Matching emotions &amp; thoughts with acts</i>					
Intervention	41	.39	64	2.14	.04*
Control	25	.16			
<i>Guessing others acts</i>					
Intervention	41	.46	64	2.04	.04*
Control	25	.20			
<i>Understanding of time</i>					
Intervention	41	.39	64	2.79	.00*
Control	25	.08			
<i>Understanding the reasons of acts</i>					
Intervention	41	.36	64	2.60	.01*
Control	25	.08			
<i>Making surprise</i>					
Intervention	41	.32	64	2.45	.01*
Control	25	.04			

<i>Joking</i>	Intervention	41	.39	64	3.91	.00*
	Control	25	.00			
<i>Understanding false belief</i>	Intervention	41	.32	64	2.18	.03*
	Control	25	.08			
<i>Empathy making</i>	Intervention	41	.23	64	2.53	.01*
	Control	25	.00			
<i>Convincing</i>	Intervention	41	.25	64	2.89	.00*
	Control	25	.00			
<i>Denying acts</i>	Intervention	41	.36	64	2.54	.01*
	Control	25	.04			
<i>Role playing</i>	Intervention	41	.22	64	3.14	.00*
	Control	25	.00			

\*p<.05

The independent samples t-test was used to obtain the differences between the post-and pre-Bender-Gestalt results which showed a significant change in those of group 1, but no change in group 2 (table 14).

Table 14 Comparison of the post- & pre-Bender-Gestalt scores of groups 1 and 2

Bender-Gestalt test	N	M	df	T	p
Intervention	42	.714	66	3.52	.01*
Control	26	.308			

\*p<0.05

Table 15 reveals the post- and pre-ADSI test scores of groups 1 and 2 where the ADSI subscales were separately compared by SPANOVA.

Table 15 Comparison of the post- & pre-ADSI scores of groups 1 and 2

	N	M	Sd.	SS.	df	F	p
Time	Within subjects			Between subjects			
Language development							
<i>Treatment group</i>							
Pre-test	40	56.10	22.90	519.88	1	12.54	.00*
Post-test	40	65.80	20.57				
<i>Control group</i>							
Pre-test	26	39.08	11.29				
Post-test	26	37.50	12.04				
Fine-motor development							
<i>Treatment group</i>							
Pre-test	40	55.00	22.90	400.18	1	8.06	.00*
Post-test	40	65.05	20.57				
<i>Control group</i>							
Pre-test	26	35.77	11.29				
Post-test	26	38.69	12.04				
Gross-motor development							
<i>Treatment group</i>							
Pre-test	40	57.92	24.64	276.41	1	5.44	.02*
Post-test	40	65.43	21.76				
<i>Control group</i>							
Pre-test	26	36.46	11.10				
Post-test	26	38.04	11.06				
Social Development							
<i>Treatment group</i>							
Pre-test	40	59.60	22.2	218.11	1	5.42	.02*
Post-test	40	67.65	19.2				

*Control group*

Pre-test 26 36.64 36.63

Post-test 26 39.42 39.42

Total Development

*Treatment group*

Pre-test 56.98 22.57 414.57 1 12.42 .00\*

Post-test 66.58 19.95

*Control group*

Pre-test 38.04 12.39

Post-test 40.38 12.23

\*p<.05

Table 16 and figure 3 (overleaf) show the statistically significant difference in the KDI scores between groups 1 and 2.

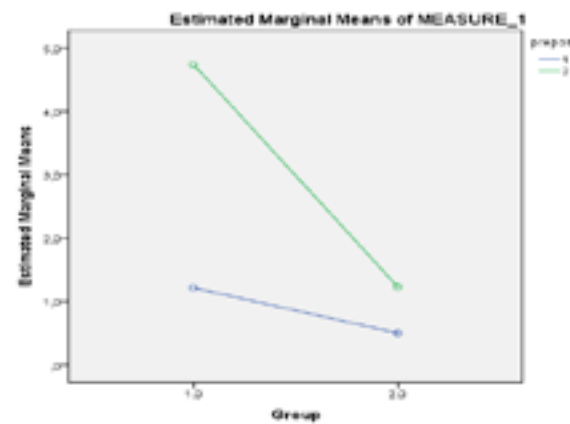
Table 16 Comparison of the post- & pre-KDI scores of groups 1 and 2

	N	M	Sd.	SS.	df	F	p
Time	Within subjects			Between subjects			
<i>Treatment group</i>							
Pre-test	40	1.2	1.2	62.64	1	74.09	.00*
Post-test	40	4.7	1.2				
<i>Control group</i>							
Pre-test	26	.5	9.5				
Post-test	26	1.2	1.5				

**Discussion**

In all aspects, drawing is a human motor response with a high priority of perception of the particulars especially on the contour of the objects and their spatial and proportional organizations which is accomplished by the coordination of cross-modal mental operations (Freeman, 1980; Koppitz, 1984; Lange-Küttner, 2000; Lange-Kuttner, et. al., 2002; Bvðhm, Lundequist, & Smedler, 2010). The aim of the intervention

Figure 3. The change in post- &amp; pre-KOPPITZ scores of groups 1 and 2.



in this study was to induce the perception of the objects, especially of the human body parts. This was rather expected with the considerable increase observed in the attention (46.3%) and memory (58.5%) task results following the intervention. As a matter of fact, there occurred an improvement in all areas of development as it was seen in the comparison of pre- and post-ADSI scores which showed a further step gain of  $\geq 10$  months in group 1, while group 2 showed that only of  $\approx 2$  months in a two-month-period (table 15).

Developmental theorists conceptualize the building-up of the grounds of the representative content of the mind, namely the object constancy, by the coordination of the senses with acts and objects with the activation of assimilation and accommodation starting as early as the 6 weeks of life (Piaget & Garcia, 1991). It was also accepted that the constructional abilities develop on both perceptual and representational competences (Bloedel & Bracha, 1997; Liben, 1999; Wong & Stevens, 2012; Koziol & Lutz, 2013). Furthermore, drawing goes beyond scrutiny on and perception of the details to the concept formation which entails global grouping processes with the activation of more sophisticated operations (DeLoache, 1995, 2004). It was also reported that although an increased amount of visual input improved the children's ability to draw by reducing the information processing load, yet this passive increase in the perception was not enough for the reproduction of a visual projection as a 2-D image (Foley & Berch, 1997). That is, the transformation of the comprehension of the world from one-dimension to two-dimensions necessitates the use of accordingly sophisticated mental operations. In fact, following the intervention there was observed a further step gain in the ability of drawing. The children, for example, with the pre-intervention KDI and DAP performances within the early

schematic level with no realistic elements, jumped into a higher level with the appearance of realistic figures, after the intervention (figure 2). There appeared not only the contour of the body in those tad-pole human figures, but also the in-between details such as the neck and palms in the post-intervention drawings. The ones, who were able to draw one-dimension human figures, started drawing two-dimension human figures also with clothing. The post-intervention line quality was also significantly improved. The lines with a heavy dot at the beginning turned to be lines with a soft start. The drawings started showing proportionality in the body parts that also were placed more realistically in their anatomical positions. Indeed, two children were able to draw a profile of a person. In summary, the improvement was seen in such aspects as; the number of items, realistic contours, in-between details, appropriate proportions, and line quality. As a matter of fact, the studies on skill acquisition reveal that a pattern of development shows a gradient from visual-motor to perceptive, representational and grapho-motor abilities. Actually, the improvement seen in the post-intervention fine motor sub-scale of ADSI scores of group 1 was consistent with the course of the development of the inter-related grapho-motor abilities included within the act of drawing (table 15). Thus, the improvements seen in the post-intervention KDI and DAP scores were believed to be indicative of an increase in the globally active processes pertaining to drawing, and not a mere increase in the perception of the objects (tables 11, 12, and 16).

It was also seen a considerable increase in the ToM and cognitive task scores following the intervention (tables 2 and 3). The comparison of the results of the two groups were

significantly different favoring those of group 1 (table 13). The improvement seen in the drawing ability and the concurrently developing ToM and cognitive functions, all of which were obviously discrete abilities could only be explained by the involvement of globally active operations. For one thing, the mental operations are considered to be domain general processes (Müller, Sokol, & Overton, 1999; Müller, Zelazo, & Imrisek, 2005; Perner & Lange, 1999). And the second, the gain of a further step in the ability of drawing is only possible with the coordination of higher mental operations to generate structures to be applied on the representations (DeLoache, 1995, 2004).

As for the mental operations, the rate of increase in the working memory task scores following the intervention showed the least rate of improvement (14.6%). This was in accordance with the timing of the activation of the working memory which was not expected to be functional before

age 4 (Baddeley & Hitch, 1974). The categorization and affirmation task scores, on the other hand, showed equal rates of increase with 31.7%. This was thought to be due to the inter-related characteristics of these two abilities, since both processes basically involve the operation of assimilation at a unary relational complexity. The rate of improvement in the process of negation, however, showed a comparatively slow rate with 23.8%. This result was in accordance with the fact that the process of negation was a tertiary relational complexity which necessitated a higher order operation than that of the affirmation (Müller et. al., 1999; Müller et. al., 2005).

The theory of mind (ToM) is a very important capacity in that the person could be able to identify the internal states of the minds, but more importantly the falsifying states of the belief (Perner, Leekam, & Wimmer, 1987; Bartsch & Wellman, 1989; Sodian, 1991; Peskin, 1992; Perner & Lang, 1999; Onishi & Baillargeon, 2005; Poulin-Bubois, Brooker, & Chow, 2007, 2009; Surian, Caldi, & Sperber, 2007). This is one of the factors that it causes a differential gradient of development. That is, the understanding of the state of false belief of the own self or other's necessitates a higher order processing than that of being aware of the reality either of the own self or the other's. The origin of the belief, on the other hand, may be the mind itself, such as; desires, thoughts, and/or intentions, or meta-cognitive abstracts, such as; photos, signposts, labels, etc. (Flavel, Flavel, & Green, 1983; Wimmer & Perner, 1983; Zaitchik 1990; Wellman & Banerjee, 1991). The imaging and neuro-psychological studies reveal that the origins of the representations result in a differentially selective activation with a high degree of cue invariance and abstraction of its original counterpart (Happe et. al., 1996; Grill-Spector et. al., 1998; Edelman, 1999; Kawashima et. al., 1999; Kourtzi & Kanwisher, 2000; Sabbagh & Taylor, 2000). This variance in the specificity of the segregations results in differential outcomes of the studies such that they show a variation depending on the cross-modal interactions of the chosen tasks (Slaughter, 1998; Perner & Lang, 1999; Stone, Baron-Cohen, & Knight, 1999). This is also true for drawing of human body parts, as well as those of the face, which were supposed to involve the functions of such associative areas performing the understanding of the human behavior and mimics (Charman & Baron-Cohen, 1992). Indeed, the post-intervention ToM scores showed a considerable increase especially in those tasks concerning the understanding of the self, such as: the recognition of the self (78.6%), recognition of the objects, face and body parts (76.2%), planning acts (56.1), understanding gestures (53.7%). Those ToM tasks involving the understanding the emotions, desires, and belief,

on the other hand, showed a moderate rate of improvement, such as; the understanding of the false belief (46.3%), making surprise, and/or joking (41.5%), matching emotions and thoughts with acts (39%), understanding own and other's wishes (38.1%), role-playing (36.6%). It was observed a comparatively slow rate of increase, however, in the ToM tasks involving the cause-effect relations of other's mind and their acts, and/or therefore the planning of manipulative behaviors. These tasks were as such; understanding the reasons of other's acts (29.3%); keeping secret (24.4%), denying actions (24.4%), convincing (25%), and empathy making (25%), hiding emotions and thoughts (22%). The diversity in the rates of improvement in ToM scores were in accordance with the course of their appearance. As a matter of fact, the ToM development shows a gradient from understanding object relations and the self to differentiating appearances from reality, understanding other's internal states, and finally manipulating others.

The young children appear not to classify objects into complex concepts in the same fashion as older children do, but rather categorize according to the degree of visual similarity to a prototype. Thus, the notion about the space starts with the sense of touch and builds up primitive relations of topology, such as; closure, proximity, separation and continuity (Piaget & Garcia, 1991; Morra, 1995, 2005). With the initiation of the operational period at around age 7, the mental operations are put in use on metric properties such as lines, angles, parallels with conservation of direction, and distance. Thus, established is a spatial "schema" in which the objects can be conceptualized within their representative counterparts (Towse, Redbond, Houston-Price, & Cook, 2000). Accordingly with the increasing mental age, these structures are reflected in the children's drawings (Lowenfeld, 1985; Lange-Kuttner, 2000; Lange-Kuttner et. al., 2002). A 4-year-old's figure, for example, is likely to be floating in space, but a 6-year-old's drawing of a person usually stands on a ground line with other objects arrayed along the same horizontal axis. The understanding of time, on the other hand, necessitates firstly the ability of the cause-effect relation, and secondly of the concept formation to take its start (Hoerl, 1999). It was also noteworthy in the results of this study that the understanding of the space (23.8%) showed a relatively slower rate of improvement than that of time (39%) in the intervention group (table 2). Our finding was important in that, to our knowledge there has not appeared any finding in the literature by now, indicating a clear-cut time of the initiation of the understanding of time versus space in the development of children. As a matter of fact, drawing of parts with a visually realistic contour and integration into a whole gradually increases and takes years to unfold and requires

two kinds of cognitive investments: the first is an increasing attention to perceptual details, and the second is a hierarchically initiated and sophisticated processes to conceptualize the spatial layout of the whole figure silhouette (Lange-Küttner 2000; Lange-Kuttner et. al., 2002). This mixed design study assessed subjects with pre- and post-tests. A relatively short intervention versus no intervention was the between subjects factor. It was observed a significant effect of the intervention on the development of apparently diverse spectrum of functions such as; drawing, ToM, and execution in the pre-operational stage. We concluded that the improvements seen in the children's drawings as well as the concurrently developing To and cognitive functions in the pre-operational stage were the result of the 2-month-long intervention which aimed to activate the gains of the previous sensory-motor stage. This study, to our knowledge, was a leading study conducted on a drawing-involved implementation for children with a developmental delay. Using the pre- and post-gains, the methodology included strong fidelity checks for the quality of the implementation, with a sample size that provided sufficient power to enable valid results. There were also some confounding factors such as the lack of control of the extraneous variables. The researchers, however, chose to use an experimental design, to compare the pre-post scores of the two groups of mental-age equivalent children. The inventory used to assess the theory of mind and cognitive development, on the other hand, consisted of affirmative questions. To analyze the data, it was needed continuous variables but not dichotomous ones. Thus, it was made a new data from the differences of the pre- and post-test scores of the inventory. This condition was valid only for variables in the t-test, and not in others. In the further research, the continuity of the positive effects of the intervention could be tested. Thus, a longitudinal work is needed to see the life-time effects of the intervention.

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# Kot | Doodling: Space, Self, Culture and Understanding

## Abstract

The purpose of this paper is to deepen understanding of the role of doodling, which involves a mind at work, where sentience, feelings, and emotions arise from various parts of the body. Doodling allows for a better chance of survival and well-being within the conditions that trigger it. A uniquely developed repertoire with an increase in skill can be developed over time and seems to be an advantage for every doodler. Doodling provides liberating solutions to everyday problems. A doodle may appear to be a simple idea or result but is complex in its development. It has a purpose, regulation, and attributes. There is a long overdue need to raise awareness of doodling as a remarkable skill that transfers to/from a metaphysical figment we call “self.”

## Biography

Marta Violette Kot is an artist, educator, and doctoral student at Teachers College Columbia University. Her research is based on the activity of doodling. She is currently a faculty member at the Silvermine School of Art, CT, teaches private studio art to students with autism, was recently a visiting artist at the CT Experiential Learning Center and the Family and Children’s Agency (Prevention for Intervention Program), CT. She taught in NYC, CT and Poland. She studied overseas in Krakow, Warsaw, Paris, Venice, and Valletta, privately in the studios of Antoine Camilleri (Malta) and Zbylut Grzywacz (Poland). Some solo shows include: National Museum of Fine Arts in Malta; 80 Washington Sq East Gallery, NYC; Macy Gallery, Teachers College Columbia University; Harlem School of the Arts; Zamek Ujazdowski Center for Contemporary Art Lab, Poland; Legislative Office Building, CT; Central CT State University Special Collections Gallery; City of

New York Office of Legal Affairs.

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## **Doodling: Space, Self, Culture and Understanding**

*There are many things that we might throw away if we were not afraid that others might pick them up. - Oscar Wilde*

Herbert Hoover, President of the United States from 1929 to 1933, was described as a master of abstract doodling, and was the first president recognized in his own day as a skilled doodler. Hoover did not wish to have his doodles published and had announced that “if they came into anyone’s hands, they were persons who had promised not to make public use of them.” His doodles are “like snowflakes: no two are exactly alike. He played with similar techniques and elements over and over, and the doodles suggest variations on a triangular theme. He did abandon his customary finesse in favor of his Frankenstein mode, creating an architectural monster” (Greenberg, 2006, p. 85-97).

Like Hoover doodling triangular themes and architectural monsters, an artist might fold Netflix envelopes, old tax documents, and other paper lying around into boats (Grusauskas, 2012). An eight-year-old musical prodigy -- a performer with an adult percussion ensemble at age of 4 and with T.S. Monk at 11-- tapped his fingers to a beat on his school desk and jabbed the air for punctuation during a rote math lesson (Child A, personal communication, March 2012). Sitting in meetings, U.S. President John F. Kennedy was similarly in constant action. His contained energy was described by Arthur M. Schlesinger Jr.: “Occasionally it would break out, especially during long and wandering meetings. His fingers gave clue to his impatience. They would suddenly be in constant action, drumming the table, tapping his teeth, slashing impatient pencil lines on a pad, and jabbing in the air to underscore a point” (Greenberg, p. 138). A seventy-five-year-old artist (Adult AC, personal communication, October 29, 1999) repeated marks over

a surface during a university departmental meeting, and a retired sixty-five-year-old engineer (Adult WC, personal communication, 1999) filled in the O’s in pages of text while seated in a gathering where a discussion is taking place. A recognized teen artist (Teen T, personal communication, Autumn 2010) taking breaks during nightly five-hour homework sessions found refuge on the borders of a notebook page beginning at the punched-out holes.

In the process, the “doodlers” never lost attention to the other action that was occurring simultaneously. They were capable of providing insight and answers to long-standing problems when in an uninspiring meeting; giving correct mathematical answers when called on, though seemingly not paying attention; and returning focus to the lengthy homework. Even Kennedy was known for his “grace under pressure” - a phrase Ernest Hemmingway coined and JFK liked. Kennedy usually maintained his “poise and his ability to think clearly” (Greenberg, p. 144). He doodled.

## **Research Method and Participants**

For the last ten years, I have been conducting lengthy interviews with people who doodle. My interviewees include teen artists, adult artists, college professors of art and art education, and young adults. This report is drawn from transcriptions of seven interviews, in an attempt to document patterns and findings.

Interviewees were asked initial as well as follow-up questions so I could validate and then clarify their responses. I asked: What kind of feelings do you recognize when doodling? How would you describe some modes of doodles? What triggers you to doodle? Where do you start to doodle? How do you begin to doodle? What might be the difference between a doodle and a drawing? What do you doodle?

The results of my interviews are astonishing and suggest that in further understanding doodling, we may garner new and useful information about how the brain manages the body. My interviews suggest doodlers did not consciously think much about it when in process, nor when moving on or away from the activity. It is not clear if doodling really “just ends.” Homework was over, meetings concluded, and the doodlers prepared to transition. At a level of consciousness the doodler knows what is no longer needed. Certain tools involving the doodle activity remain. Some of these tools include instinctive responses to measuring time and space and the ability to initiate internal and external templates.



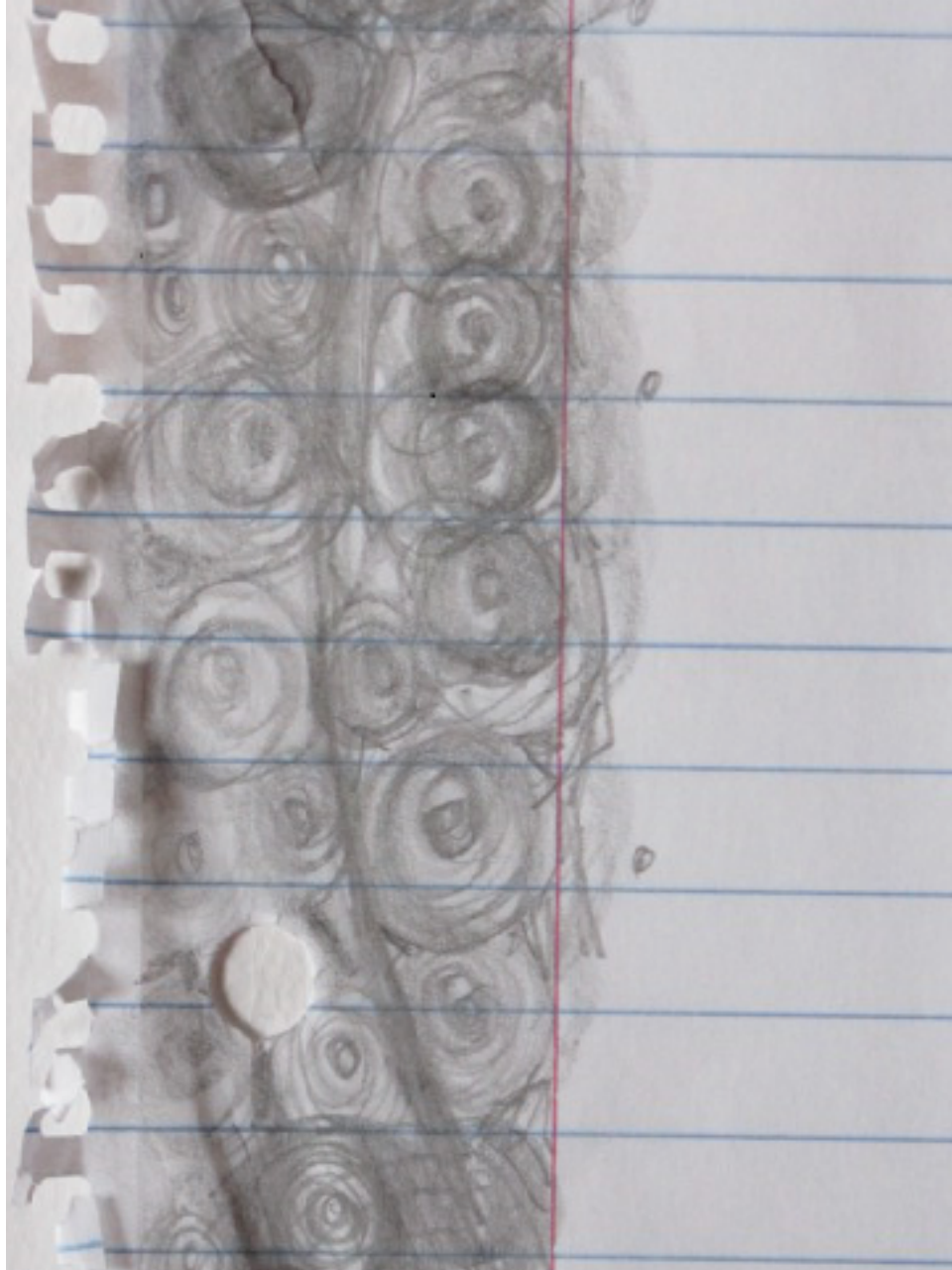


Figure 1, Adult Artist, Age 45

#### Notions of Doodling

Notions of what doodling is have expanded over time. Doodling has a history of causing sticky situations even in the Oval Room. “Attorney General Elliott Richardson not only irritated Richard Nixon by his doodling – ‘He thought I wasn’t paying attention,’ the former Harvard Lampoon cartoonist explained – he very nearly scotched his own cabinet nomination by doodling through his confirmation hearings,

causing senators to accuse him of arrogance” (Greenberg, 2006, p. 9). What is it and why do we do it? When asked, we claim not to think much about it before, during, and after. We just start. Though doodlers may show similarities within their work, it is never the same from doodle to doodle. It is of the moment, not analyzed or looked at again. The doodler, if asked, describes the doodling as ending when the other activity is over. It is my impression from interviews collected, as a proficient doodler, and from recent scientific understanding of how the brain manages the body, that the process of doodling never really ends at all.

Moreover, several of the doodlers said that they temporarily stopped doodling on paper after being interviewed and questioned about their doodling. I have “intruded” on the instinctive responses they enacted when doodling.

In a larger sense, doodling is traditionally understood as an activity that is executed in some unexpected place. For instance, it might come into view in the margins of lined notebook paper, or a manuscript, when the doodler is preoccupied with some other activity. (Figure 1 - left)

#### Camille, Hayman, Pickering and Earlier Doodling

The word doodle first appeared in the early 17<sup>th</sup> century; it meant a fool or simpleton. It derives from the German dudeln, to play (originally to play the bagpipe or dudelsack) (Oxford English Dictionary, 2012). The American English term dude, originally a German rustic term for a fool, may be a derivation of doodle (Thorne, 1991).

The extensive documentation of doodling, in the form of very small drawings and “scribbles” in margins and manuscripts and on notebook pages, prompted speculation on the activity by scholars.

In a study by Michael Camille (1992), it was shown that doodling that takes place in the margins represents arenas of confrontation, places where individuals crossed social boundaries. They have been described more recently by one scholar as “like the doodles in the student notebooks...the signs of daydreams.” What can be said about the kind of “daydreaming” that might be taking place? What might be the simultaneous connection between “self” and the environment?

I would like to consider an explanation put forth by V. S. Ramachandran, (Ramachandran & Blakeslee, 1998), professor and director of the Center for Brain and Cognition at the University of California, San Diego, when trying to make sense of Camille’s study. According to Ramachandran, “self” is an illusion and “there is probably no single entity corresponding to it in the brain” (p. 84). He proposes two pos-

sibilities: First, “when we achieve a more mature understanding of the different aspects of our mental life and the neural processes that mediate them, the word ‘self’ may disappear from our vocabulary” (p. 272). Ramachandran suggests that in understanding DNA, the Krebs cycle, and other biochemical mechanisms that characterize living things we have offered an answer to the question: What is life?

Second, Ramachandran offers an idea that “‘self’ may indeed be a useful biological construct based on specific brain mechanisms—a sort of organizing principle that allows us to function more effectively by imposing coherence, continuity and stability on the personality” (p. 272). These “brain mechanisms” can be used in the act of doodling. They may be automatically useful human acts of survival within the “self” and the cultural environment when there is a need.

In Camille’s (1992) examination of the cultural space of the margins, he explores how doodles in the thirteenth century came to be “constructed and colonized with such creative combinations.” For instance, he describes how workmen in hiding the altered faces in the Reim’s Cathedral from viewers below, may have demonstrated an early form of doodling. Theirs may have been a playful doodle-like practice. We know that skill was important to the carver and the cast of the altered stone was taken out of the sculptor’s wages. Camille concludes that “in this sense the freedom they exhibited in this one type of undedicated unseen and unauthorized sculpture emerges as a rage, jeering and tongue-showing that mocks the edifice of its authorities” (p.84).

Geneticist and critic Jacques Neefs (1997) conducted a study limited to the traditional border between margin and text in the works of certain authors. This border makes of the margin a place for possible additions, expansion, and commentary. Neefs concludes:

“Certain studies of typography have found that the margins have a tendency to disappear; it becomes filled with drawings and suggests that the margin as well as the new perspective it offers, is in distinctive harmony with the aim it accommodates. It allows for the imaginative development arising from an already established point of view” (Neefs, p.135).

“The margin,” described by Neefs, “is like a space left for the reader, for his/her moods, reactions and remarks, a dialogue thus takes place, on the other side of the border of time, on the other side of the border that separates reading from writing” (p. 137).

Doodling, in the margins where it seems it has a place, allows an exercising of freedom to move into “otherness.” (A hint of this possibility is

found in the discussion below of Pickering's connections with language and pictoriality.) I am brought to wonder what might instigate someone to start doodling and how we can describe a possible relationship between "otherness" and the illusion of "self" during the process? As I have and will demonstrate doodling can be recognized outside of traditional margins.

In the history of doodling, studies have suggested a difference in form, content, and personae between complex first versions of manuscripts and final ones. Such studies include David Hayman's (1997) study of Samuel Beckett's *Watt* and Robert Pickering's (1997) study of some aspects of Paul Valéry's *cahiers*.

In the *Watt* manuscripts, Hayman found that the first version suggests an increase in intense concentration and tentativeness, and in its development and physical appearance, an overflowing humor and creative energy. Hayman states that "the original opening was far more expansive and, in some respects, even wittier than the current one and that it was set in a somewhat different context" (Hayman, p. 172). Instead of locating Beckett's action outside and near a tram stop, making its focus the bench coveted and seized by the hunchbacked Hackett, the action takes place inside what appears to be a pub. Beckett's complex first version includes a proliferation of doodles that can invite consideration about his composition process and moods.

Pickering connects Valéry's contribution in the notebooks to the creative associations between language and pictoriality. He concentrates on a limited number of points central to the "creative overlapping of verbal and visual" and examines their status in relationship to the genesis of the text. Pickering describes how the use of diagrams has the effect of intensifying thought by projecting spatially its abstract dimension. At the same time, "sketching or imaginative drawing can occur in context far removed from instances of essentially rational preoccupation generated by a kind of imaginative reverie." Apparently removed from any explicitly illustrative intention, Pickering describes this form of drawing as "close to doodling as if it were not underpinned by certain principles which situate it in relation to various criteria - that, in particular, of an openness towards an at first unspecified artistic potential which progressively gels to produce a coherent composition." Pickering refers to this activity as "free sketching with possible unconscious motivation with Freudian undertones." He examines images as a more detailed reference to text and claims that the image which emerges is "one of a little recognized artistic temperament, constantly attuned to the pictorial potential of a deep engagement with reality,

dependent also on the immediate project of aspects of thought in visualized form, a tendency which calls for a revision of the commonly held view of a different thinker immersed in the rarefied strata of abstract self-contemplation" (Pickering, 1997, p.159). Pickering suggests that doodle making illuminates the process and content of one's evolving thoughts. He describes what may be a release of imaginative tension that is reflected in the process of the activity. It is an engagement that one does without constraining others.

An example of what Pickering suggests can be found in JFK's doodles. "After compulsively drawing rectangular boxes striped with horizontal lines, he playfully turns those rectangles into two very different images: a musical staff with a treble clef and a modified American flag" (Greenberg, p. 148). JFK imaginatively elaborates upon his repertoire of boxes.

*Ramachandran, Freud and Doodling*

In trying to understand Pickering's reference to Freudian undertones, I am reminded of Ramachandran's questioning of the "laws" of psychological defense mechanisms. He points out one of Freud's lesser known claims, that he had discerned the single common denominator of all great scientific revolutions: "Rather surprisingly, all of them humiliate or dethrone 'man' as the central figure in the cosmos" (Ramachandran & Blakeslee, et al., p. 156).

Ramachandran outlines the first of the great scientific revolutions, which Freud said "was the Copernican revolution, in which a geocentric or earth-centered view of the universe was replaced with the idea that earth is just a speck of dust in the cosmos" (p. 156). The second was the Darwinian revolution, "which holds that we are puny, hairless neotenous apes that accidentally evolved certain characteristics that have made us successful, at least temporarily" (p.156).

The third great scientific revolution Freud claimed was "his own discovery of the unconscious and the corollary notion that the human sense of 'being in charge' is illusionary. He claimed that everything we do in life is governed by a cauldron of unconscious emotions, drives and motives and what we call consciousness is just the tip of the iceberg, an elaborate post hoc rationalization of all our actions" (p.156). From a scientific understanding, Ramachandran believes that Freud "correctly identified the common denominator of great scientific revolutions but does not explain why this is so" (p.157).

Ramachandran's description is an interpretation of why "cosmology, evolution and brain science are so appealing, not just to specialists but to everyone." He explains that "unlike other animals, humans are

acutely aware of their own mortality and are terrified of death. But the study of cosmology gives us a sense of timelessness, of being part of something much larger. The fact that your own personal life is finite is less frightening when you know you are part of an evolving universe - an ever unfolding drama. This is probably the closest a scientist can come to having a religious experience" (p.156-157). Ramachandran explains that this aligns with the study of evolution "for it gives you a sense of time and place allowing you to see yourself as a part of a great journey. And likewise for the brain sciences. In this revolution, we have given up the idea that there is a soul separate from our minds and bodies. Far from being terrifying, the idea is very liberating. If you think you're something special in this world, engaging in a lofty inspection of the cosmos from a unique vantage point, your annihilation becomes unacceptable. But if you are really part of the great cosmic dance of Shiva, rather than a mere spectator, then your evitable death should be seen as a joyous reunion with nature rather than as a tragedy" (p 157). Ramachandran provides a quote:

"Brahman is all. From Brahman comes appearances, sensations, desires, deeds. But all these are merely name and form. To know Brahman one must experience the identity between him and the Self, or Brahman dwelling within the lotus of the heart. Only by so doing can man escape from sorrow and death and become one with the subtle essence beyond all knowledge."  
-Upanishads, 500 B.C.

Time and space are frequently mentioned by my interviewees. They are described in terms of a kind of conscious effort, necessary to acknowledge, in order for survival in the given situation. Exploring this effort and the use of time and space offers an opportunity to discuss the activity of doodling as something with a faithfulness to freedom, similar to John Cage's description of it in his work "Silence." Doodlers do not intend to consciously start doodling and by "Silence," Cage means "a freedom of one's intentions" (Helms, 1997, p.77). We might consider this a discipline with a feeling of a subtle essence that aids in sustaining a level of focus.

As a musician interested in the essence of everyday experiences, Cage became increasingly open to various sound possibilities. His aesthetic preference was neither for his own music nor that of any of his colleagues, but rather for the sounds and noises of everyday life. Through the use of chance operations done faithfully and conscientiously, Cage discovered that he actually liked things he thought he didn't. So rather than becoming a more and more refined musician, he would become more and more open to the sounds of life not always aware of. (Helms, 1997)

Cage was against linearity and in an exhibition at the Museum of Contemporary Art he installed a show in which the walls of three galleries were covered with eccentrically placed pictures. What concerned Cage was the lesson he hoped to teach an unsuspecting public about the importance assigned to things and people. “Chance, like all natural disasters, is a great leveler of all it touches” (Johnston, 1994, p.75).

I suspect that doodling allows for an even a greater chance opportunity. Cage intended to use the space and location at a different level of consciousness than a doodler would use when doodling during some activity or a lecture. There appears to be an aspect of doodling, as a chance operation that may allow for indeterminate change in the individual involved. The doodler does not talk about the practice as an artistic expression. Is this perhaps closer to how our brain and bodies may store, utilize, idle, and develop a repertoire of simple expressions, feelings, and sounds from everyday life?

#### Repertoire

My interviews suggest there can be recognition in doodling that suggests it is an activity for which there are tools and templates already developed. The knowledge and tools are perhaps less complicated and less general, though remaining sophisticated, than what we might experience in the process of drawing. This may be because it is at least in part built on a repertoire. Over time we may create in our bodies our own tools to transfer tasks. The doodler could succeed while doing less because the tools take over from the tasks and do more. Tools, as with the doodles, develop with age and experience.

#### Writing and Doodling

Presidential Doodles, written by David Greenberg (2006), offers an account of the relationship between writing and doodling. “Writing itself became looser and more doodle-like.” Greenberg explains how “itinerant penmanship instructors, often juggling other fashionable sidelines in daguerreotyping and cutting silhouettes, distinguished themselves in the mid-1800s with manuals featuring ever-more baroque swirls and flourishes, not to mention fanciful drawings of angels, birds, and grinning fish; indeed, the title page of at least one textbook is so covered with this calligraphic frippery that the words themselves are obliterated. But by the time of Abraham Lincoln, a generation of children had grown up with increasingly affordable pencils and steel pens. These youngsters practiced flourishes, repeated words over and over, and sketched out fanciful beasts in cheap notebooks and on the endpapers of Latin grammars” (p. 8).

#### Doodling in the 1960s

According to a DVD audio commentary, the word “doodle” in Frank Capra’s movie *Mr. Deeds Goes to Town* was used in a sense that was invented by screen writer Robert Riskin (1936). The lead character Mr. Deeds announces that a doodle was a word made up to describe scribbling to help a person think. An entire scene takes place in which Martin Semple has passed on and Mr. Deeds combines what would be typical of important conversations about a large inheritance with playing a few notes on his tuba. While Mr. Deeds announces a lack of interest in inheriting twenty million dollars, he shows that he is conscious of what is being presented while it seems he is doodling on his tuba.

In the court house where Mr. Deeds is carrying his instrument and leaving others to view him as insane, he doodles some more and at the same time defines some aspects of doodling when he says that he plays the tuba whenever he wants to concentrate. He comments on the fuss that people are making about him playing and reminds us that we all do something silly when we are thinking. He provides an example to the Judge: “You fill all the spaces in the O’s with your pencil. I was watching you. That may make you look crazy...you know just...just sitting around and filling in O’s...but I don’t see anything wrong because that helps you think” (Riskin, et al., lines 330-331). Mr. Deeds continues by describing doodling as “a name we made up back home [Mandrake Falls, VT] for people who make foolish designs on paper when they’re thinking. It’s called doodling. Almost everybody is a doodler. Did you ever see a scratch pad in a telephone booth? People draw the most idiotic pictures when they’re thinking. Dr. Von Haller (psychiatrist in the court room assigned to evaluate Mr. Deeds) could probably think up a long name for it because he doodles all the time. This piece of paper he was scribbling on...I can’t figure it out! One minute it looks like a chimpanzee and the next minute it looks like a picture of Mr. Cedar. You look at it Judge. Give it an A for defense. It looks kind of stupid, doesn’t it your honor? But I guess that’s alright if Mr. Von Haller has to doodle to help him think. That’s his business. Everybody has something different. Some people are ear pullers. Some are nail biters. That Mr. Semple over there is a nose twitcher” (line 332). “And the lady next to him a knuckle cracker” (line 333). “So you see, everybody does silly things to help them think. Well I play the tuba” (line 336).

This example from the 1936 film illustrates that varieties of doodling occur as a response to who we are and something we do...“while thinking.” Mr. Deeds seems to know that he can doodle with his tuba and also suggests the importance of having it with him for this reason. The

artists I have interviewed view their doodling as important. They speak of this as a way to relieve stress and to allow what is beneath the surface to arise, therefore providing solutions to daily problems and those they encounter in their studio art practice. The interviewees described doodling as an aid to staying focused on the external variable and allowing the “hand do what it wants.” Doodling is not merely scribbling but a developed skill involving memory and experience.

Unlike many, Mr. Deeds shows awareness of the role of doodling in the environment and in his personal experience. He seems to have referred to it as a highlighted norm. As previously mentioned, President Kennedy was known as an accomplished doodler. Capra’s script was written in 1936 and examples of the President’s doodles were exhibited in 1964. There is an awareness of “doodling” during this time where

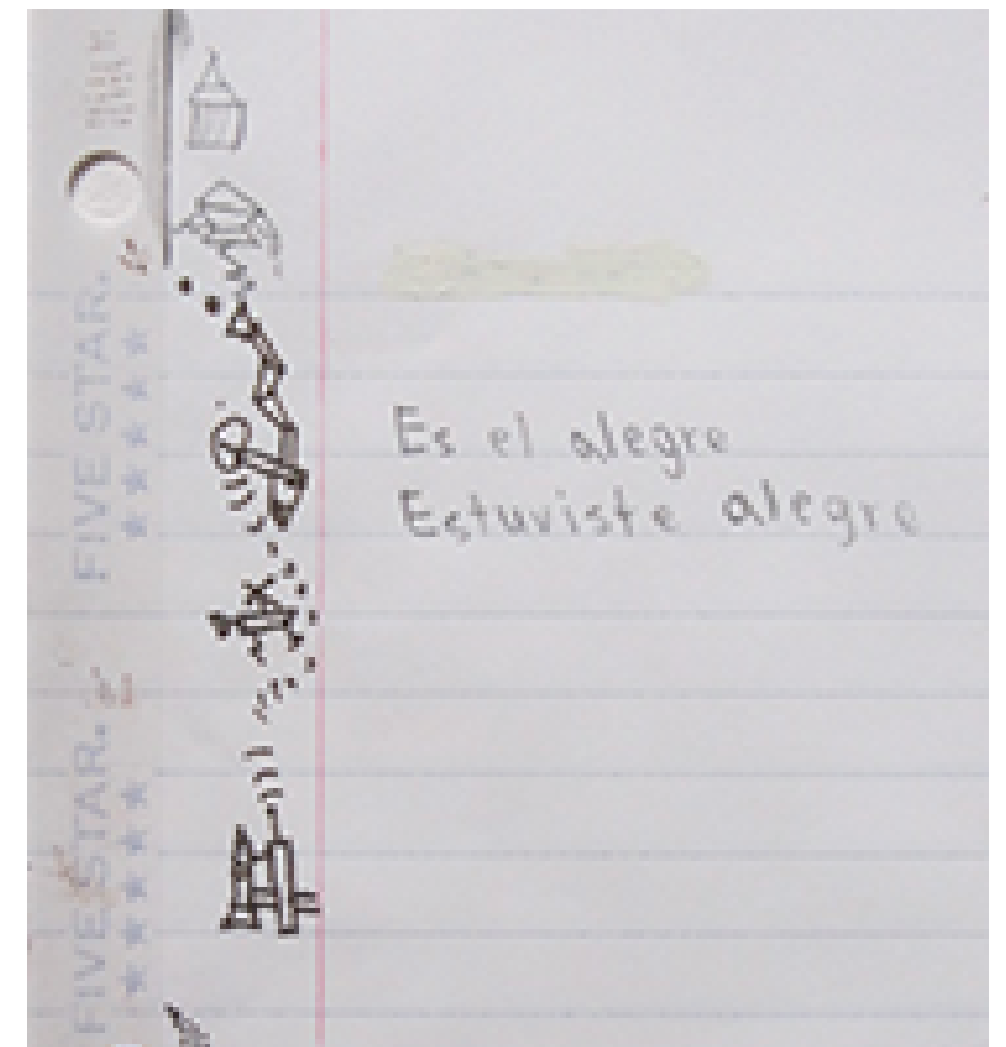


Figure 2, Child Musician, Age 10



Figure 3, Adult Artist, Age 67

movies and exhibitions are examples.

*When Does Doodling Begin?*

Responses gathered during my interviews offer examples of when one may doodle. Interviewees were asked to describe when they begin to doodle. From their responses, it is understood that doodling may begin during a high school math class or, for a talented eight-year-old, after finishing an assignment and waiting for the next activity. (Figure 2) It may begin while on the telephone, when writing lists, or while planning a vacation. It might start when feeling apprehensive, or when searching for painting subjects.

One adult artist interviewee described doodling as something that

begins when she is “not receiving something” to keep her interested. She explained “doodling is like a trader to fill in time, like empty time and empty space” (Adult L, personal communication, October 14, 1999). (Figure 6) We are reminded of our need to understand evolution and in allowing one to sense oneself as a part of a “great journey.”

Doodlers described their doodling as something that will begin when there is a need to stay awake, to do something so one does not “space out,” while knowing there is a block of time available along with a need to self-occupy. Again, doodling becomes a way of filling this space and time.

These interviewees demonstrate an understanding that doodling can take place during a lapse in what is going on in class. (Figure 2 and Figure 6) It can start when one has a feeling of a need to procrastinate or when feeling anxiety or stress.

For instance, a young adult artist described the doodles she made during her teen years. “I had just started high school and was dealing with a rough transition. I no longer doodle so many smiley faces or angular shapes (they’ve been replaced with hearts and rounded shapes). The middle appears to be English homework from 11<sup>th</sup> grade (Figure 10) and the last from my 11 grade planner (Figure pg 8). They’re from my most stressful year of high school, thought before it got extremely stressful—I was stressed but not crazy stressed at the time of these. I like to draw repetitive and curved forms, and like to go dark with the graphite since I like the therapeutic feeling of rubbing a pencil along the same track. When I am stressed out enough, I will go back to drawing more angular shapes, especially pentagram stars (scary connotation, but not intended) probably since I can still follow a continuous track with them. I press the hardest when upset.” (Young Adult ET, personal email communication, September



Figure 4, Adult Artist, Age 67

3, 2013).

An adult doodler announced that she doodled regardless of whether she is bored/paying attention. She described “just” doing it when required to listen or sit for a long time and this may be when she is in a class that she “loves” and even during teen years. She is not aware if her doodles are any different, though, when she is bored (Young Adult ET, personal email communication, September 3, 2013).

Prompted to think more about their doodling, doodlers described the experience as a hand allowing one to feel more connected to the external environment by association. This can be with something that was

written first, as in a meeting, or when taking notes. This can happen when doodling in a small area while waiting for something to “catch one’s attention” or can be written by the doodler about what is said.

**Triggers**

The interviews suggest that there is always an initial trigger. This may be the feeling of just beginning to get lost in thought. There are “restrictions that are going on to keep one from letting his hands do what they want to do,” so doodling becomes an outlet (Adult B, personal communication, September 21, 2000).

Some have described feelings of being “caught in a daily grind of reality.” Doodling becomes a necessary response using creative expression to survive (Adult B, personal communication, September 21, 2000).

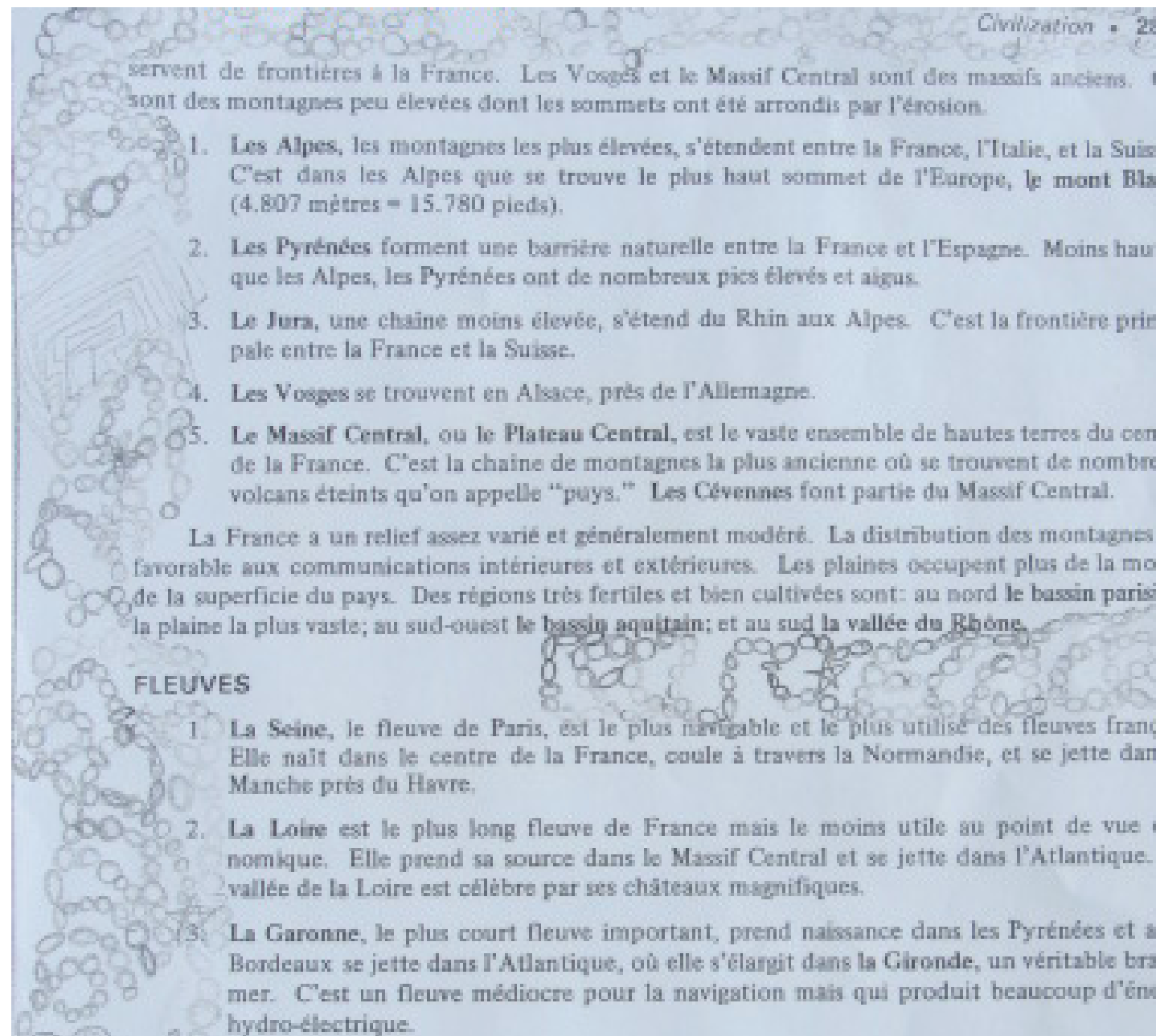
Triggers can be the need to generate meaning and the bodily urge to do it. Doodlers have described a feeling of needing to utilize imagination and knowing there is a time that is available for self-expression. A trigger can even be a feeling of needing to allow some feelings and memories to surface. There are even moments that trigger “safe” or disguised doodles when someone is watching. A trigger can involve feelings of existential anxiety like waiting or being in a situation over which you don’t have control. (Figure 3) Doodlers respond to a déjà vu moment provoking doodles that enhance the feelings of past experiences.

Artists interviewed described doodling as being prompted by the urge to relax and reduce anxiety. (Figure 4) This might occur on the “little days when you want to give up and doodling makes it alright” (Adult B, personal communication, September 21, 2000). The reaction to the trigger is impulsive and offers a soothing feeling of rhythmically moving the ball point pen back and forth.

Triggers can be urges, such as moments when feeling a need to make small spaces solid. They can be an automatic response, such as from a “squeaky thing like a marker.” This would stimulate one to “bubble in more” (Adult B, personal communication, September 21, 2000).

There is a suggestion that triggers involve several variables simultaneously. There might be a need to have a stage where something exists on the paper already such as a pre-typed agenda, lines on a page that provide structure, or even an earlier doodle to trigger elaboration. (Figure 5) In this activity there is a sense of knowing something can be drawn that “represents” or fills empty space. It can serve as an aide to remain connected and there is some level of conscious knowledge

Figure 5, Adolescent Artist, Age 15



using a physical or internal template. Templates are developed by the doodler and aid in allowing an instinctive doodle response to occur when needed. A physical template may be written text or the die cut holes on a page. The internal template can be one’s developed repertoire or understanding of the feeling of the pen moving back and forth.

Certain triggers occur at certain times. When a doodler is aware there is more time, she may become more purposeful. (At this point the doodler is aware of the location and space the doodle will occupy.) (Figure

6) One adult artist said: “I like listening to talk radio and it’s like I have to fixate my conscious thinking mind (before painting)...the mind that like wants to interfere with my hands are doing onto something so it doesn’t bother me and like how my hands might get busy and do their thing and not be...it’s almost like this different schism of different things going on in your head because there is this active control of this part of your mind that always wants to interfere. So when I have the radio, or I’m on the phone on hold or something like that, it kind of creates this passage of release for my hand” (Adult B, personal communication, September 21, 2000).

**Where Doodling Begins**

Where one chooses to start to doodle varies but may tend to follow one’s own doodle repertoire developed over time and years. Some interviewees described needing something already on a page and feeling an urge to make some doodles in their repertoire bolder. Doodlers can begin around the circles of binder paper and, if a binder has spirals, bolding around that. (Figure 1, Figure 2, and Figure 7) Interviewees described beginning with the first letter on top of a page and elaborating. Other letters can be elaborated as a starting point as well. A starting point may be between the lines of a page or between lines of a written text. The starting place may vary for one particular doodler and may start at the bottom but never work its way up. It may start from the left and follow to the right as one reads and then work around this, moving top to bottom, and bottom to top. It seems as if there needs to be some structure already provided and an awareness

of this space. (Figure 4 and figure 6)

A starting point may also become a returning point. It often begins as if a small space was a way of defining the space with doodle lines or a doodle shape. Then one may be drawn back to a previous doodle and begin anew.

There is an indication that, as the doodling space becomes larger, the doodler may feel more connected with the larger external space and environment. Sometimes a doodler may need to turn the paper in different directions to locate that starting point. Space is used over and over again while starting points are layered. Some doodlers expressed that they will never turn paper over to doodle. Every doodler invents his starting space. This allows tacit knowledge to flow, as eye and hand responses are coordinated and instinctive. It is similar to the flow experienced while drawing though on a smaller scale.

A doodle may not have a starting or finishing point. When questioned, interviewees indicate that they are not thinking about where they start or finish and suggest feelings similar to idling. The triggers and re-triggers are personal and the results are unique and doodler specific.



Figure 6, Adult Artist, Age 53

Descriptions of doodling suggest a skill that develops with time and age. All interviewees speak of starting small within a small area of space. This may unintentionally expand and may become quite elaborate. As a result, we often find patterns. Doodlers did not report a direct connection from their conscious thoughts to their doodles. One starts off with a sense of the space to fill.

#### Modes of Doodling

Modes of doodling differ. There is the described feeling of moving hand and pen and the natural strokes of one's finger back and forth to thicken lines. Sometimes doodlers feel similar emotions and feelings similar to playing: "that nice feeling of the moving ball pen back and forth" (Adult AC, personal communication, October 29, 1999).

A common description is the urge to move. The hand takes over and begins to draw. Some doodlers describe the doodle mode of being at another level and detached from the external event and also absent from one's conscious mind. If a doodler is aware of being observed, the doodle changes to what feels "safe." A doodler may cross out a doodle, disguise it, or even stop doodling.

"My stuff is always the same...I think for me it is a way of remembering" (Adult L, personal communication, October 14, 1999). (Figure 6) An adult artist is aware that a doodle repertoire has been established. It is about remembering and being able to repeat these images without having to think about it "all that much."

As a doodler and artist, I suspect the variables overlap and serve each other. The process may be relaxing, "allowing one to find peace." The doodler's mode may be a feeling of engagement starting with a familiar repertoire that often goes beyond what feels familiar.

Doodlers report being unaware of their thoughts, feelings, or experiences. Repeating approaches and patterns, going over lines again and again, allowing things to grow "if time allows" are all aspects of a doodle process. Doodling feels good but is never separate from the awareness of the outside activity. The doodler understands time and space and may have a feeling of purpose. The doodler may think that "it may end up over here" and may instinctively know he (or she) will start off small.

Doodlers describe the impetus of feelings of exploration. They describe the sense of knowing when they might doodle. One may walk into a lecture feeling alienated and/or anxious. Doodling results in feeling satisfied and fulfilled. Doodling assuages an "urge to do something

with one's hands while in a state of anxious waiting" (Teen T, personal communication, Autumn 2010). (Figure 8) Doodling provides a method of feeling connected to the immediate world. Even if doodling brings you to an imaginary place where childhood feelings can emerge, the process keeps you connected to the "self" and the immediate environment.

Doodlers have described feelings of being in an imaginary world and absent from reality. This sense is unique to doodling. This is not drawing. It is an elemental kinesthetic flow unlike drawing which involves a different level of conscious awareness. One doodler recalled the same sense of engagement as when manipulating and playing with blocks as a young child (Adult B, personal communication, September 21, 2000).

Some doodlers scribble out or will "blob" their doodles when they don't like them. Perhaps there was disconnection and the doodler was unable to find satisfaction. There is an objective awareness of the doodles which may trigger the urge to conceal. If there is a corresponding end to the external activity, the doodle is not concealed.

#### The External Environment

Interviewees described that the doodler cannot be removed from the external environment and still doodle. There is a symbiotic connection. Though you feel you are in a world of doodles, you are still absorbing the world outside. The external activity is essential for doodling. It acts as a trigger.

Doodling may not be approached purposefully but may be approached to fill emptiness of time and space. The point is to sustain a connection with "self" (feelings and emotions) and "...to survive as one with the subtle essence beyond all knowledge...as a joyous reunion with nature" (Ramachandran & Blakeslee, et al., p.157). The essence may be understood as reaching a "doodle zone." What is this zone?

#### The Doodle Zone

Doodlers report the feeling of returning to a comfortable experience, this "meditative state," as a doodle zone. Your conscious mind is on something else. You are swept into a "subconscious" flow. Your hands may respond. You may start a doodle in a small area with something from your repertoire and the flow carries you to a further elaboration. (Figures 3, Figure 5, and Figure 9)

According to my interviewees, while in the zone, one is fully engaged in doodling while still conscious of the external activity. This zone

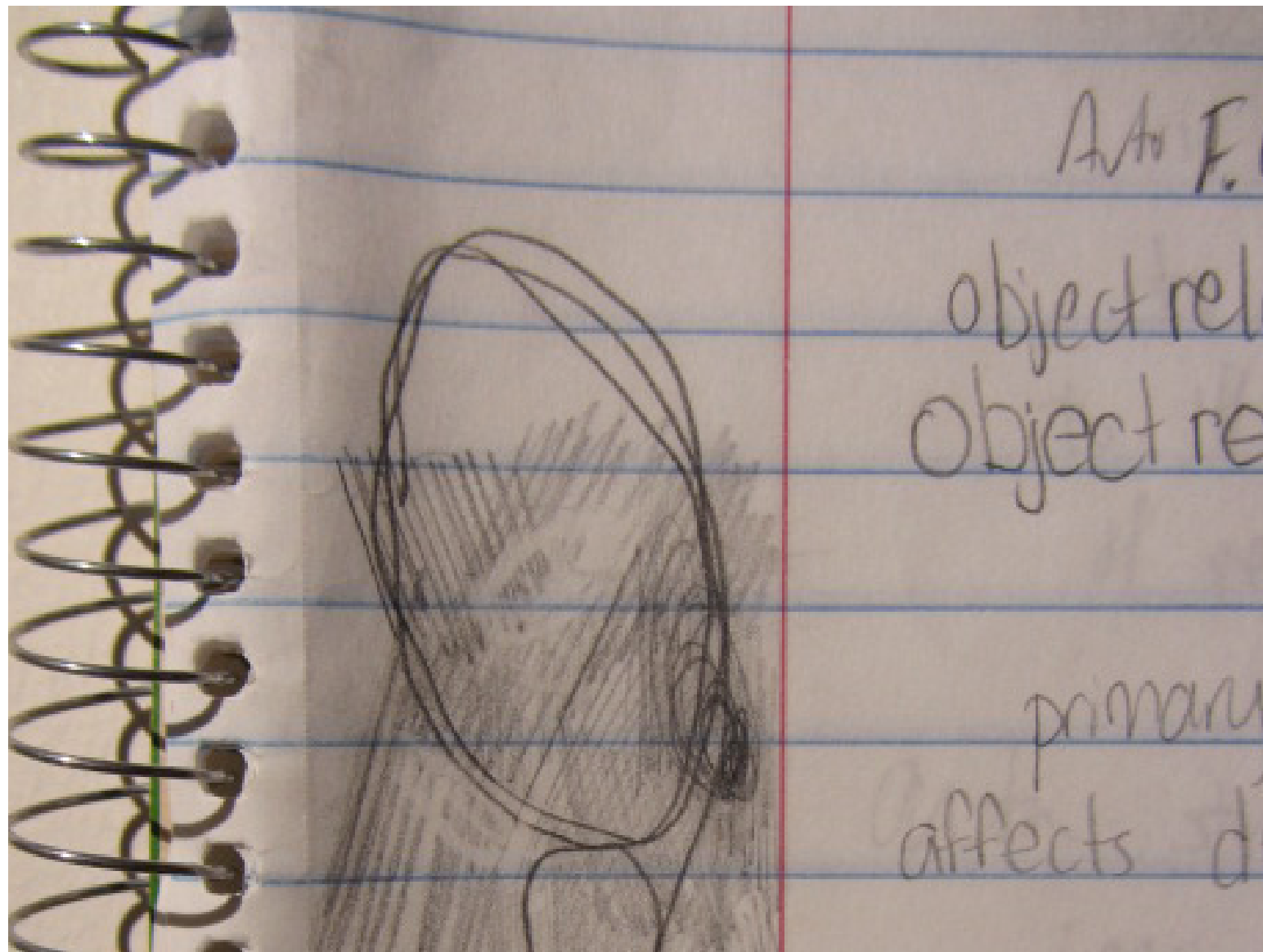


Figure 7, Adult Artist, Age 47

continues while in the original repertoire and deepens as the familiar repertoire is extended. At this point of expansion, doodles may be widened, layered, and detailed. There is a “feeling of working it over and over again until one can’t put anything else in” (Adult L, personal communication, October 14, 1999). (Figure 1)

The suggestion is the doodle zone involves at least just enough of a level of alertness to sustain connection with the environment. It would be interesting to see the results of a brain scan of a doodler in this zone. This could be compared to a scan of the individual’s brain when he is viewing a work of art or experiencing some other pleasurable sensation.

I suspect the scans would look similar.

**Age-related Thematic Variations**

My interviews also revealed age-related thematic variations. These include images of everyday play experiences by eight-to-ten-year-olds (Figure 2) and themes of geometry, biology, fashion and design, sex and death, and realistic imagery by adolescents. (Figure 11) Adult themes include feminism, politics, social issues, abstraction, rhythm and repetition in design, disguised doodles, biology, déjà vu, and play. (Figure 4, Figure 6, and Figure 9)

Adolescents and adults reported remembrances of doodling as a child as far back as ages seven and eight. They recall making shapes and seeing pictures of figures made out of shapes. Years later these developed into

little images where they could still recognize the earlier influences.

Children reflect current thoughts in their doodles. (Figure 2) For example, a sword may start off floating in space and a less detailed image symbolizing a person would be placed under and to the left. The doodler had a collection of found sticks with which he played. He also talked in detail about the different swords in the Harry Potter movies. An eight-year-old interviewee said that he was aware of other children’s script writing but had not yet been taught the skill. He drew a series of lines in different directions to make sense of it. This eight-year-old may be repeating what is remembered from an art lesson, such as line exploration and watching someone draw a spiral with equal distance

between the lines. He appeared to be re-exploring newly introduced material in a manner that felt comfortable or intriguing (Child A, personal communication, Autumn 2010).

Adolescents doodle eyeballs, skulls, and lips, and will incorporate modeling with different pencil values. Interviewees described rendering 3-D forms with a light source or shadow. Adult artists reported remembering doing this when they were adolescents. We see profiles and frontal views with expression, shade, and reflection. Calligraphy is part of the doodles. We may see the making of a big first letter as on the opening page of a book. Letters may show elaboration: they may be thickened and intentionally merged into one line. An adolescent doodled the memory of a cat’s, sister’s, or her own eyes. The adolescent’s world is reflected in their doodles. (Figures 5, Figure 8, Figure 10, and Figure 11)

Adult artists, in my study, reported doodling images of abstract blobs. These may be a result of less pleasing doodles. These blobs become symbols, pictures, or images. Adult artist doodlers showed plant-like forms, eyes, patterns, and elements of repetition. There are elements of

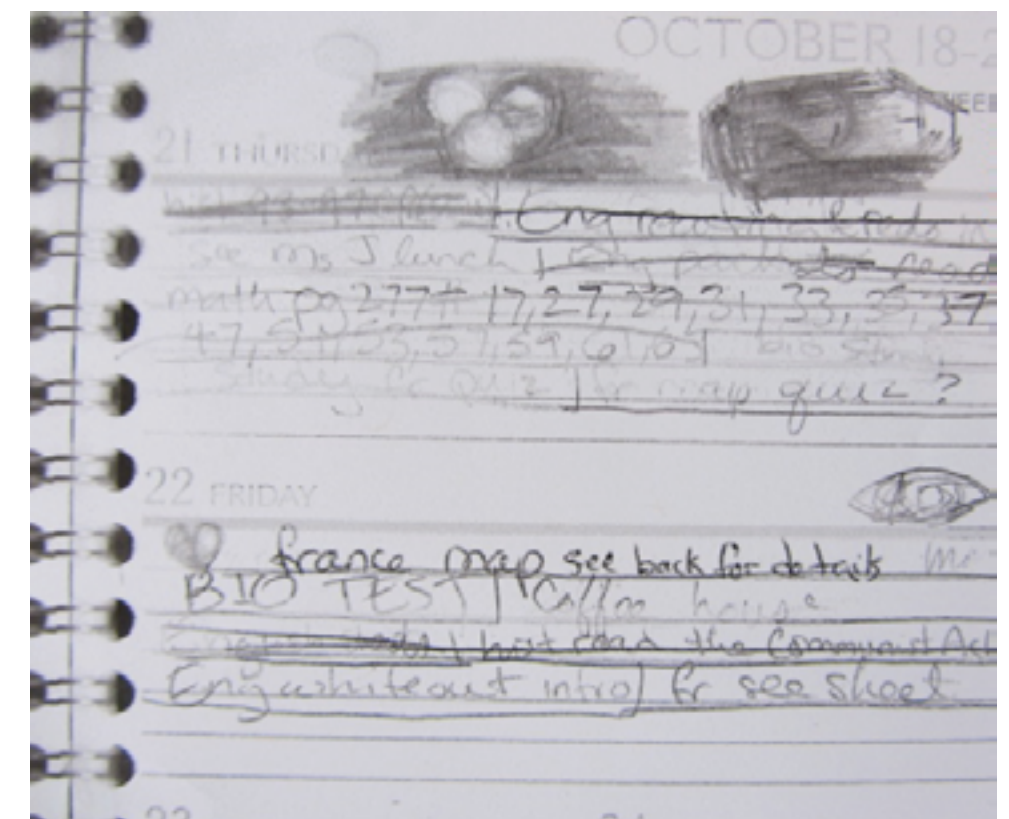


Fig. 8 below. Fig. 9, 10, 11, 12 & 13 overleaf.



IV. "Civil Disobedience"

1. What does Thoreau mean by "That government is best which governs least." *stay out of ppl's affairs as much as possible*
2. What does Thoreau mean by "Yet this government never of itself furthered any enterprise, but by the alacrity with which it got out of its way." *libertarianism, laissez faire works*
3. What are the obstacles over which commerce and trade bounce? *ones made by govt*
4. What does Thoreau ask for in P. 37? *a better govt, not none. see what kind ppl want*
5. What does Thoreau say is his only obligation at any time? Compare this with Emerson's beliefs in "The Nonconformist." *we should be non-conformist after the way of holding one's conscience before the world*
6. What is "a common and natural result of an unjust respect for law." *it is as things against their nature*
7. What is Thoreau's explanation of how a man should behave toward his government? *How is this idea reinforced by the last sentence of p. 97*
8. The first sentence in p. 11 expresses views similar to Emerson's. What are they and how are they similar? *Rebel if conditions are bad*
9. In what situation should you break a law according to Thoreau? (p. 12) *if it prevents someone else from doing what is right*
10. What does Thoreau mean by the first sentence in p. 15? *if ppl stand up for other ppl who are wronged*  
How did it apply to what was going on in Thoreau's time?
11. What happens when a man's conscience is wounded? (p. 15) *you hurt yourself by not doing what is right*
12. Why was Thoreau put in prison? What effect did his imprisonment have on him?
13. When will there be "a really free and enlightened State?" *if a state just locks up the people who are not like it*
14. How does Thoreau describe his ideal State? (p. 22) *independence, respect for the individual, respect for the individual, be just to all*  
*independence power to the individual gives power to the State (Locke?) It is hated well*



Enthusiasm

Feb. 25

6:30 - I CANNO HANDLE THE GALLERY SCENE. SEEING THE RELATIONSHIP BETWEEN MY PRIVATE THOUGHTS AND THE COMM. CONFUSED ME. I FEEL I CANNOT

7:30 - THE WINTER WORLD IS ORGONED UP

rod child. of the the other what and by all she was

Clockwise from top-left. Fig. 9, 10, 11, 12 & 13 overleaf.



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various motifs and constant variations. Visual rhythm developed from already existing elements of variation. Some marks were very tiny and very contained. For example, little people, or a “scribbling” motion using circles and ovals, became a teddy bear. Curly shapes, spirals, curlicues, circles, outline drawing, and even little people were a part of the adult repertoire. Exploring the possibilities of a marker using different levels of pressure occurred. An adult artist reported “messing around” with line quality using whatever writing instrument was at hand. Adult artists’ doodles led to row after row, building a structure. There was a return to darken and widen some lines, building layers. There was an urge to go back to place a “little” dot inside each circle. They glided their pens to make organic designs and paisleys and then expanded around them. (Figures 3, Figure 4, Figure 6, Figure 12)

Some adult artists reject representational doodles. Therefore they stuck with doodling circles, asterisks, and spirals again and again. Patterns of shapes were repeated and built on to, using the same lines and shapes. These may not be perceived as variety by the doodler. The same adult artist may analyze her work and see composition in her doodles and question if this is a work of art. (Figure 6)

As with adolescents, adult artists recognized symbols that appeared earlier on a mother’s postcard. This memory might have been reflected in the artist’s bolding of her name and address and writing it over and over again.

Adult artists reported a sense of déjà-vu in the doodle process. A trigger to doodle interacts with a trigger to remember. Adult artist interviewees said they will use images they earlier used when first introduced to painting even as far back as their teen years. Ten years later these may be reflected in doodles as well as in their artwork. Even if the adult artist is no longer using the doodle images in her paintings, she will use her developed drawing skills in her doodles. Adult doodlers may be left with a feeling of accomplishment. They indicated that they feel accomplished because of the higher skill level. (Figure 13)

#### ***Doodling and Drawing***

Doodling may cross over to drawing. Doodlers reported that this takes place when one no longer pays attention to the external activity. When a lecture ends, the doodling “just ends.” However, this is not disturbing unless one has crossed from doodling into the realm of drawing.

I asked doodlers what might be the difference between doodling and drawing. Responses suggest that when doodling one does not necessar-

ily have a focus on the doodling and that the activity of doodling itself is enough. Adults will leave the doodle zone by shifting focus from the external activity to what may be “drawing.” Figure 9 gives an example of a doodle that was about to enter the realm of drawing. The doodler was aware that she was reducing her awareness of the external activity. The artist stopped doodling at this point, while conscious of the need to focus on the external activity. She described a feeling of tension, of needing to end, though also the pleasing feelings of reaching this level of doodling and moving on to the realm of drawing.

There may be other than visual dimensions to doodling. For some adult artists there is a satisfaction when the whole page is covered. For these artists the covered page is felt to be a work of art. (Figure 6) The process of doodling can be “emotional” satisfaction and analytical evaluation. Doodling ends when the external event ends where drawings may be reconsidered and reworked despite the end of the external event. Where doodles always are small, drawings may or may not be. Unlike when drawing, an artist may or may not be similarly aware of thoughts or feelings while doodling. Doodles remain unexamined while the artist will analyze her drawings.

Interviewees were asked to describe when they choose to change their drawing implement. They described that in doodling there is very little thought about changing drawing material. Doodlers are attached to an implement and this becomes part of the doodle repertoire and is necessary for the doodler to doodle. It is an extension of the hand. When drawing, an artist may consciously explore using different brushes, pencils, etc. The doodler’s surface is often presented with existing letters, lines, holes, and margins while a drawer invites unlimited possibilities. Most interviewees said that they will not doodle with a wide or “fat” marker.

It may be that drawing develops one’s ability to focus more directly while the pleasure of doodling helps one stay in focus. The process of doodling is felt, while the process of drawing is consciously thought out as well as felt.

Interviewees said that doodling develops as needed and may result in ideas for a painting. It aids in thinking. One artist needs the feeling she gets when doodling to transition to sketching.

#### ***Emotions and Feelings***

As the interviewing progressed, respondents were less likely to eliminate the idea that emotion and feelings are part of the doodle process.

There seemed to be confusion that ultimately led to not eliminating the idea.

Doodling provides a time for feelings and thoughts beneath the surface to arise. As in dreaming, it allows unfinished, unanswered, uncomfortable experiences or relationships to resolve. A practiced doodler may find that doodling can calm anxiety or help cope with past feelings of childhood anxiety. If the feelings become too intense or disturbing, a doodler can transform his doodle into a “safe” doodle or scribble the doodle (thought) away. It is soothing to move the ball point pen back and forth. This is reminiscent of how kids rock back and forth when feeling uncomfortable. Therefore doodling could be considered an acceptable adult substitute for childhood rocking. Doodling satisfies the need for self-calming when thumb-sucking, toe-biting, and rocking are no longer appropriate. It can become a personal substitute for the repetitive body movement common in children. Soothing rhythmic and self-stimulating movement reappears as doodling in pre-adolescence, adolescence, and adulthood.

#### ***The Role of the External Activity***

Those I have interviewed shared both differing and similar thoughts about the role the external activity plays while doodling. When needing to shift focus solely to the external activity, the physical manifestation of the process of doodling is put on hold. Doodling can “stop” for reasons as simple as becoming aware that he or she is doodling. Intrusions such as the crinkling of a candy wrapper may cause one to abruptly “stop.” Awareness that you are being observed will also cause a halt.

While in the doodle zone after an interruption a doodler may experience a sense of delicate tension. There is a desire to return to the pre-interrupted state. Doodlers talked about the need for the satisfaction of filling a page. However, if the lecture drones on, the doodler may feel frustrated having no outlet if the page is understood as filled.

#### ***Understanding***

People seem to have a need to understand the role of doodling. Body function and mind offer clues and potential answers. The world of doodling may encompass new media. For example, does labeling something a doodle make it a doodle? Google asks its doodle community to “doodle” on demand and within parameters: theme, size, material, deadlines, etc.

In 2000 Google’s founders, Larry Page and Sergey Brin, asked the current webmaster, Dennis Hwang, to produce a doodle for Bastille

Day. The positive reception to his work led to Hwang's appointment as Google's chief doodler. He started with doodles to celebrate holidays but has broadened his offerings to address a wide array of events (i.e. ice cream sundae). The demand for doodles on demand has increased worldwide. Google claims that this addition to their homepage enlivens and "brings smiles to the faces of Google users from around the world" (About Google Doodles, 2012).

Google is making its own rules. Google is an innovator and has broken the tenets of what is commonly thought of as doodling. It is on demand. Google gives instruction. The company offers rewards. "They" decide on the doodle space.

Recent studies on doodling fail to address what I believe are essential components of the process. The studies are of "doodlers" asked to "doodle" on demand and out of context and within a specific time. These studies are conducted in the lab environment that does not allow for the feelings associated with doodling. Doodling needs to be understood as connected to some external activity.

My exploration is leading toward further avenues of research. These include developing an understanding of how the process of doodling enhances how brain manages life in a body, and how doodling responds to, or reflects, our understanding of culture and is characteristic of the way we think and are self-aware.

In my work with young artists on the autism spectrum I have noticed certain characteristics similar to doodling. These students quickly develop repertoires that include repetition. When confronted with new situations their repertoires develop and indicate a higher skill level. This development occurs more quickly than that explained by the artist doodlers I have interviewed. The study of doodling may help us understand how those on the spectrum interpret their environment and their normal ways of communication. It may be worthwhile comparing functional MRI's of those on the autism spectrum with doodlers.

Antonio Damasio, internationally recognized leader in neuroscience and university professor at the University of Southern California and adjunct professor at the Salk Institute, may offer insight and scientific evidence to make sense of the kind of consciousness that takes place while doodling and how it connects to the body. Damasio explores "self," linking body and emotion to the biological roots of conscious thought and its role in survival (Damasio, 2010). His exploration can aid in developing our understanding of how contemporary cognitive science can be transformed by new meanings and interpretations and help

us better understand doodling's role in our daily experience. There is something to recognize in doodling about a remarkable skill(s) and what we might learn if we can understand how it transfers to and from a metaphysical figment we call "self"...or the conscious experiences. While knowing more about the state of the body in our brain, for example while in the doodle zone, we can understand how doodling increases the management power of the brain. We may understand the doodle zone as the essence of drawing and its role in the drawing process.

This research is ongoing and, like doodling, is an activity that never "just ends." I would like to better understand the regulations and attributes that are involved with doodling and how these develop with time and experience. Doodling imposes coherence, continuity, and stability on one's personality and helps us survive.

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# Lee Weider | Frederick Froebel's Influences on Drawing Education: Reclaiming Invention and Play in Mark-Making

## ABSTRACT

This article explores drawing practice within the educational philosophies of Frederick Froebel. Froebel offers art education and studio practice a great deal of influential approaches, unique media inspirations, and enduring philosophical contexts for drawing. Froebel introduced exercises in linear drawing with horizontal and vertical lines, outline drawing of contours, free-hand and nature drawing, and circular drawing and drawing from memory. Froebel also suggested more exploratory drawing activities in service of observing, connecting, and evoking form. His approaches toward drawing as varied explorations of nature, contour, and shape with unique art media can open up pedagogical possibilities for rich understanding of form and playful, sensory experiences in contemporary art education.

Keywords: Froebel, drawing, Occupations, Gifts, creativity, development

## Biography

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## Introduction: Creativity, Play, and the Senses Through Mark-Making

Drawing may include an array of essential artistic acts of playing, creating marks, planning, sketching, studying, and creating images. It is often understood as the backbone of artistic development (Lowenfeld, & Brittain 1987; Burton 2006; Hurwitz & Day, 2007), for mark-making is perhaps the first creative act of a young child, and sketching becomes the center of future artistic processes of many adolescents and adults throughout their artistic lives. Although drawing instruction might be more readily associated with philosophers like John Ruskin, Herbert Spencer, or Ebenezer Cook, kindergarten inventor Frederick Froebel

(1782-1852) emerges as a philosopher who uniquely cultivated children's perception, creativity, and exploratory processes of sketching through attention to beautiful objects and forms of nature. (Figure 1 is a drawing of Froebel that is included as the frontispiece of his collected writings). Froebel's books and those of his followers are aesthetically distinctive in

*Figure 1: Frontispiece of Papers on Froebel's Kindergarten, With Suggestions on Principles and Methods of Child Culture in Different Countries, Henry Barnard, editor. Hartford: Office of Barnard's American Journal of Education, from Adelphi University Archives and Special Collections.*

that they contain pages filled with ornate drawings, illuminations, and images, and the Froebelian education theory within these texts uniquely outline the value of self-initiated, exploratory children's learning as part of their creative processes (Mullineaux 1996). Froebel's frameworks are generally not utilized or acknowledged in contemporary classrooms; but given their usefulness in art education, especially drawing, this author recommends them as valuable tools in drawing curriculum.

Froebel offers contemporary art education and drawing instruction a great deal through his hands-on legacy of 'learning playfully' with objects from nature that represent essential forms (Liebschner 1992). Bowen (1901) noted that Froebel's education theory frequently utilized creative activities within instruction not explicitly to form artists, but to awaken children's perception and their other senses through drawing and related activities. This article will explore Froebel's philosophies with regards to drawing and his theories' continuing potential in developing perception, representation, and creative play within young people. In addition, this analysis will address the influence of Froebelian philosophy on art educators and artists.

## Froebel's Playgifts and Occupations as Creative Explorations of Form

In her history of drawing, Kelly (2004) identifies Froebel's great interest in children's drawing, from scribbling to intentional marks of line and form. Froebel particularly emphasized drawing not only as part of mathematical skill development through geometric lines and shapes, but also as a dual practice in developing both creativity and representation (by mirroring observations from nature). Children's mark-making explorations within Froebel's approaches evolved from exercises in linear drawing with horizontal and vertical lines, to outline drawing of contours, to free-hand and nature drawing, to circular drawing and

drawing from memory. Froebel prized drawing as a meaningful method of observing, connecting, and evoking that children naturally adopt:

for the child that is led to observe nature and surrounding things [the line becomes] a means of further representation. So the circle that he can draw fairly, now becomes for him the picture of the moon, the sun, a disk, even of an apple, a ball, a hoop, a ring . . . He has seen in meadows, in the garden and field, the three-leaved clover . . . radiating flowers and numerous feathered leaves (Wiggins & Smith 1986: III)

In this description we observe the importance of drawing in developing a sense of form and perceptual awareness of formal qualities. Drawing is not only documentation of the natural world, but also the pleasurable documentation of thinking and understanding by the observer. Froebel described young children's growing understanding of form and its universality within his theory of unity (*Lebenseinigung*). He created practical tools to aid understanding of formal qualities: ten simple exploratory objects for young children's learning (called *Spielgaben* or *Playgifts*). These ten objects were common and colorful forms such as spheres (or balls), cylinders, blocks, and cubes. These Playgifts are the most basic shapes and forms through which all other structures can be discovered during observation, play, discussion, and finally contour drawing and sketching of shapes. Locating the Froebelian Playgift as a representation of unity, psychologist Kilpatrick (1916: 76) also found 'in the pleasurable interplay of the mind back and forth between symbol and thing symbolized, each may become clearer in its relation, each may be enriched by elements of the other.' The use of Gifts, along with activities of drawing, painting, and playing are found in contemporary curricula of Froebelian schools such as The Froebel Education Center in Canada.

Froebel particularly emphasized that children should be 'learning playfully' (Liebschner, 1992) through the progression of formal discoveries of shape, color, movement, and other qualities of form with his Gifts. Through the Playgifts, open-ended processes of play are introduced and facilitated by a teacher within the framework of *Occupations*, or activities which teach the child through exploration in drawing, weaving, and modeling. The teacher is to observe, acknowledge, and encourage the creativity of the child in seeing, imagining, and creating forms and structures in collaboration with his or her parents and peers. Froebel's approaches to creative play extend to a variety of artistic activities and evocative objects such as pyramids, architectural forms, spheres and other ubiquitous and generative shapes. His approach aided creativity

development through open-ended investigations of nature and these natural forms, such as observing and then sketching a circle can evolve into future drawings of a moon, a sun, a ball, a bubble, and other spherical objects. I have often observed my own students use the form of a circle to also draw flowers from observation or imagination (Figure 2).

*Figure 2: Image from second grade art and poetry workshop with the author.*

2 is a drawing by a second grader from an art and poetry workshop I taught in 2009).

The child’s creative learning occurs through hands-on, exploratory experiences with materials and processes of growing complexity, from spheres to bricks and pyramids. In this way, drawing students can recognize and represent circular forms that lead into explorations of spheres and cylinders. Figure 3 is a playful drawing exercise investigating form through tools, created by one of my graduate students in art education. Extending playful learning with Playgifts, Froebel continually encouraged these drawing activities. Froebel’s drawing practice for children included mark-making (the beginnings of artistic development in drawing) not only with crayons and pencils, but also

*Figure 3: Drawing exercise exploring tools by Adelphi University graduate student, Curtis Widem.*

with natural objects such as pebbles (Polito 1995: 223). This essential exploration of early mark-making or sketching with simple tools offers useful considerations of how we might employ a richer array of drawing media in children’s art education.

Drawing upon his own background in architecture and design, Froebel valued various types of sketching for playful creative expression. As an architecture student, he initially mused ‘how can I work through architecture for the culture and ennobling of man?’ (Downs 1978: 19). Over the course of his career, sketching was an enduring philosophical pursuit for Froebel of relating basic objects and their design to all the forms found in nature through the processes of geometric and free-form drawing. Froebel also studied mineralogy before becoming an educator, and worked within a museum where his own interest in form and plans for the Playgifts developed. He noted that his interest in minerals extended primarily to their transforming ability, such that ‘rocks and crystals served as a mirror wherein I might descry mankind and man’s

development and history’ (Downs 1978: 26). Froebel later encouraged young people to also draw crystals in some of his exercises, and he continued to relate drawing practice, representation, and teaching throughout his pursuits. Further, the shared developmental potential of drawing, nature, and people are part of his great and poetic appreciation for all three.

#### *Exploring Sketching and Symbols Through Play*

Sketching and play explorations with objects from nature figure in a great deal of Froebelian philosophy around children’s development of symbolic understanding. In her book translated by Ms. Mary Peabody Mann (an educational reformer in the 1880s), Von Marenholz-Bulow describes Froebel’s sense of play as ‘art in the garment of play’ (1887: 99). This sort of mirroring between play and art offers an additional representational parallel around learning and drawing. Blow (1900: 85), a contemporary of Froebel who was called the mother of kindergarten, observed more specifically:

a toy is only a symbol, whereas it is the spiritual reality which the symbol suggests that allures the imagination. What the girl demands of her doll is the quickening of maternal love in her heart. What the boy craves of his horse is that it shall waken a presentiment of his own power over nature. The too perfect toy chills the imagination, and hence the child turns from objects which by remotely suggesting an ideal heighten the activity of fantasy.

The toys that children play with are often inseparable from their drawings. Young students represent these objects as symbols in early drawings, along with stories about the real and imagined adventures of stuffed toys, dolls, figurines, and other toys. Lerner (2005) argued that Froebel could even be seen as a pioneer stage theorist, for his objects were carefully selected in sequence to correspond with children’s drawing development and their learning about symbols. So too, Lowenfeld and Brittain (1987: 310) would later assert that the figure of the horse (which appears in so many female children’s drawings) can express escape and movement within the creative growth of young girls, as ‘a symbol of running, dashing freedom that is part of the joy of growing up.’

Froebel’s conceptions of gendered children’s play (while somewhat essentialized in casting girls as future mothers and boys as to-be conquerors) still indicate historically based reflections about children’s social engagement with objects through their imaginative drawings.

For some, they also lead to questions of how contemporary students and their teachers can continue to question play and images or symbols of playthings as opportunities to reproduce or re-present gender relationships. How and why might boys engage with dolls in play and drawings? How do girls manipulate and render toy horses and transportation symbols in their drawings today? By looking at serious and playful issues of teaching artifacts and drawings in a continuum with Froebelian gifts as symbols, we can carefully curate objects of art instruction and impact rich possibilities for children’s creative representations of them.

In theorizing play and representational processes further, Froebel was especially concerned with the role of the teacher and parent in play with objects and representational symbols. He emphasized that children love to draw objects from imagination and life because they need this exploration, and he then proposed that adults must have objects to draw and play with (as well as students), echoing contemporary practices of parallel learning (Liebschner, 1992). Although this may seem a minor point, it demonstrates Froebel’s strong commitment to the teacher’s parallel process of participation in harmony with child learners. Keeping children’s work separate from the direct intervention of adults also suggests that children’s explorations are artistically valuable. This point could be applied to today’s teaching as well, particularly in visual arts education.

For example, in working with pre-service teachers during art education courses and student teaching, I have often encountered in-depth inquiries about the nature of touching and altering students’ drawings. Specifically, it feels very natural to sketch a small amount of students’ work when they are encountering difficulties. I remember an art teacher commandeering my own childhood artwork in an extreme manner, even drawing ‘x’s’ through my sketches when they met with her disapproval. This approach of finishing or redirecting my marks alternately confused, alienated, and intimidated my creativity in drawing, and I have observed the same subtle reaction in other young students. To take over someone else’s drawing in this way may be akin to interrupting an idea before it has been fully uttered, for drawing is often part of thinking. To counter unconscious tendencies to impinge on our students’ drawings, teachers can instead use a piece of scrap paper to demonstrate a technique as a possibility without taking over the creative process, echoing Froebel’s insistence that the teacher have a set of manipulatives (whether Playgifts for exploration or art materials for representation) for him or herself. Careful consideration of ownership in creative development, objects of creative play, and exploratory artistic marks that develop into intentional drawing are particularly relevant

within teaching of beginning artists of any age.

*Froebel's Drawing Philosophies and the Art World*

Froebel's sense of playful learning included looking at Playgifts, experiencing them through play, and related drawing activities that extend past childhood. Froebel's influence can also be strongly felt in the art world and in the training of art teachers. As Kelly (2004) observed, Froebel was a unique educational philosopher in that he argued not only for drawing's role in developing mathematical skill, but also for drawing in its own right and for its own sake. Froebel saw drawing as a tool of representation and understanding, as well as creativity and invention. Hansen (2003) has traced the influence of Froebel's Gifts and Occupations within the early creative learning experiences of artists such as Joan Miro's exploration of tactility, Johannes Itten's valuing of play and improvisation, and sculptor Kiki Smith's childhood investigations of geometry with her artist parents. More specifically, the Occupations had clear influence on Bauhaus exercises of artistic design for adults.

*Figure 4: A History of Play: Froebel Eames Studio by Eamon O'Kane.*

*Figure 5: Interior view of A History of Play: Froebel Eames Studio by Eamon O'Kane.*

Artists and educators may find rich inspirations within the work of Eamon O'Kane, whose contemporary installation art beautifully documents and reimagines Froebel's Gifts, Occupations, and influences in a colorful studio space of line, color, and shape. (Figure 4 is entitled 'A History of Play'; Figure 5 is a detail photograph).

For art education histories, it can be illuminating to consider the influence of developmental drawing activities from Froebelian education. Froebel (1895: 274) described explorations of drawing and pointing in the air for young children as part of their development from 'perception to picture.' This activity fits nicely with current practices observable in Visual Thinking Strategies across the age spectrum of K-12 through adulthood (DeSantis & Housen 2002), in which the student and teacher look closely at a work of art, then point and trace lines in the air in front of the art that echo contours within the work. When I have utilized VTS with high school and college students, I could see their process of tracing a horizon or shoreline with the eye, and then the finger, translate into their contour drawing development. In drawing, these processes of tracing could also fit in a continuum of using a viewfinder or creating a thumbnail sketch. Further, Blow (1900) sought to enrich

the natural drawing impulse of children as a phenomenon encouraged within other aesthetic, nature-based activities of Froebel's early childhood curriculum: tracing contours in the sand, making shadow images on the wall, blowing onto the window pane and decorating its cloudy surface, and even biting food into the shapes of creatures. These sensory-rich and experiential investigations with line are still of interest in contemporary art education practices in early childhood (Tarr 2001). Older children and adults can take this spirit of play into representation and non-objective practices of drawing, deriving inspiration from stains, shadows, clouds, and accidental shapes throughout the world. The tools of mark-making and surfaces for marks need not be restricted to paper and pencil, and childhood inspirations can open up amazing possibilities for all.

Along the same lines, Froebel's practices offer beautiful frameworks for experiences extending from line to color. Kilpatrick (1916: 80) describes how a child

has noticed the name ultramarine; when she meets the color, the name already more or less associated helps her to fix in mind this particular shade of blue. More exactly, the word ultramarine was experienced under such circumstances as to show that it referred to color and possibly to a blue. The partially identified name may then remain in mind as a query: Just what kind of a blue is ultramarine?

This sort of creative musing on color and rich experience of its name, description, and meaning is just the kind of color inquiry that can enrich art education around drawing with colorful materials. Examples such as these from the primary sources of Froebel's writing may prove of particular interest and inspiration for pre-service teachers studying art education histories and examining how they can still impact contemporary, sensory-rich lesson planning and their relationships to drawing and other media. For example, we can invite students to create line and shape with oil pastels and colored pencils that explore particular colors and shades from robin's eggs to skies to seas.

*Concluding Reflections: Froebel and Drawing in Creative, Experiential Contexts*

As we consider how Froebel can guide many drawing explorations, Liebschner (1992: 140) reminds us that Froebel's teachings are to be 'worked for, thought about, defined, sensed, discovered, and appreciated.' This varied conceptualization enhances the experimental and exploratory practices of drawing as comparable and complementary to those of pedagogy. Just as we may sketch out ideas and inquiries in art, we can also approach our teaching with a sense of rich engagement and the vast possibilities of line and representation. Froebel's emphasis

on pedagogical practice mirrors his valuing of a range of drawing explorations with natural objects and creative art media. He also makes a case for the perceptual relationships we recognize in form, and those human relationships we explore with fellow learners and teachers. My own earliest experiences with drawing are linked with my very first book, a hand-drawn creation from my mother, which was given in the spirit of a Froebelian Playgift (Figure 6). This object was an illustrated narrative filled with beloved objects and symbols to my six-year-old self, including crystals, amulets, unicorns, and magical characters. My mother's gift was my favorite possession, a work of art and a keepsake that brought me into shared worlds of looking, drawing, and reading

*Figure 6: Image from a hand-made children's book given to the author as a birthday present by Alexandria Weida, 1986.*

(in a spirit I believe would have met Froebel's approval). So too, young people learn to draw before they ever learn to write, and live within realms of image and form before naming and inscribing. The spirit of providing inspirations and ideas as gifts to our art student may still be of use to educators.

As we begin to sketch out futures for art education and drawing instruction, Froebel offers a great deal of context and possibility. If we look at drawing as a vast category of processes that include planning, outlining, and mapping, Froebel suggests ways in which perception, exploration, and unity can be emphasized. Drawing was not an isolated exercise for Froebel and his followers, but rather a part of the processes of play, expression, and invention through a range of art media (including paper folding, sewing, weaving, and clay work). Drawing practice thus becomes an important tool, a process building manual skills, and a form of visual thinking and analytical learning. Froebel's visions of drawing as varied explorations of nature, contour, and material can serve to continue to draw children and educators into formal and metaphorical possibilities in art and lead them to richer multisensory experience and understanding of their worlds.

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# Magalhães + Providência Dreamed Gestures: A Case of Architectural Design Communication through Drawing.

## Abstract

Here, we aim to discuss that which generally refers to the contribution of drawing in the understanding of the design project, and particularly in relation to its communication in architecture. From a heuristic perspective, it is accepted that drawing recreates ‘ways of seeing’ which facilitate the project. Through its functions in supporting and stimulating the idea, throughout the project, drawing contributes to the idea’s development in accordance with the stratified process of design.

We present a case study of project communication by considering drawings by the architect Rui Pacheco (1929 - ) which were created in response to a commission from renowned Portuguese architects in the second half of the twentieth century, in order to provide a three-dimensional prediction and to commercially communicate architectural projects among promoters.

Anticipating three-dimensional modelling with digital technology, Rui Pacheco constructed images through a complex methodological process which departed from the two-dimensional representation of the project, in favour of a three-dimensional model which would serve as a blueprint for the new two-dimensional images – such as with European painting in the seventeenth century.

In this case, the representation exceeds the functional consideration of the project, in that the modes involved in the drawing participated in the idealization of the *heterotopic* representation, steering the perception constructed by the public, users or by the designers themselves.

Through this research, we aim to contribute to critical debate and to the multidisciplinary nature of drawing, design and architecture, intersecting the practice of drawing with the project, so as to encourage an understanding of the interdisciplinary potential in generating new ideas and solutions which the project seeks to address.

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## 1. Introduction

We aim to present that which is generally referred to as the contribution of drawing in understanding design and particularly the communication of the architectural design. The analysis of the images that we display here will be considered according to this principle.

Even without claiming its formal classification or semantic valuation, we will see these drawings as the centre of a possible visibility in which Drawing is close to the discipline of Design.

As a subject (formal object) drawing is considered as the construction of imagery, i.e. resulting in an action materialized either bi-dimensionally or three-dimensionally and visually inscribed. Therefore, the graphic shapes characterized by formal content enable, manage and resolve the representation of the idea. From the perspective of design it is a clarifying iconography (concept / knowledge) through the action (symptomatic / symbolic) of drawing.

Thus, drawings are capable of symbolically representing the project, mediated by the technique chosen by the author; drawn images interpret the architecture as an ideological entity, which associates the desire with the symbol.

Various dimensions may be observed in the drawings of Rui Pacheco, which begin by responding to the necessity of attributing visibility to the architectural project, featuring a cinematographic narrative which anticipate the *heterotopic* experience of architecture, graphically shaping the perception of the target audience, the user, the entrepreneur or the project manager.

The work of this architect/draftsman is of particular interest in relation to drawing due to its link with architectural activity, at the turn of the millennium. If, on one hand, the unusual peripheral manifesta-

<sup>1</sup> Contrary to the English language, the words ‘*desenho*’ (drawing) and ‘*design*’ do not have distinct translations in the Portuguese language. In the Portuguese language ‘*desenho*’ (drawing) is a much broader and comprehensive concept than in English. Whereas in English ‘*drawing*’ is mostly the approximate relationship between graphic representation and reality, in Portuguese ‘*desenho*’ also includes reflection, knowledge, idealized projection, etc.

‘*Desenho*’ (drawing) resulting from the action of the verb ‘*desenhar*’ (to draw) means, simultaneously, intent and image. It is the translation of the Italian ‘*disegno*’ which word had its origin in the Renaissance, in Italian language born in Tuscany, and not in Latin (disseminated through the Accademia delle Arti del Disegno, in Florence, in fifteenth century). ‘*Disegno*’, means the wide projection (planning) of the whole, as conceptual project. Hence, approaching the word ‘*design*’ in English.





Fig. 1- Pacheco, *Hotel Parque de Lassalet*, graphite and black indian ink on tracing paper, 380x602mm

tion can justify its contribution to global knowledge, conversely we can also find evidence of an unexpected originality, which arises from the mythologized existential experience of the author himself, using drawing to revive an archaic culture, with props that resist the new, brings us back to the past.

## 2. Methodological evidence of the Images

Returning to Hans Belting's concept regarding *image-medium-body*<sup>2</sup>, the images exist through desire, idealized through a medium of technique controlled by the body's intention. "The images (...) do not exist by themselves, but happen / succeed / occur, take place, whether treated as images in motion (in which case it is obvious) or whether they are instead static images". (Belting, in Pinotti, 2009: 75).

As H. Belting states, the difficulty in distinguishing 'how' from the 'thing' constitutes the true essence of the image. The 'how' is the way (the medium) by which the image is known by the body (designer, drafts-

<sup>2</sup> the study of images proposed by Hans Belting departs from the presumption that the concept of the image can not be adequately understood without the reference to two concepts which, with the image, comprised a fundamental triad: medium and body. The medium is what makes the image visible and by which it can be reported. The image does not exist without a supporting medium. According to Belting, this results in a distinction between mental images (from memory or imagination) and material images (a picture or a photograph). Although the first are in reality linked to a medium which is our body, due to what we perceive, remember, imagine, produce and report all kind of images. "(...) the images live in their medium just as we live in our bodies". Hence, body signifies the body which reacts when the body perceives. Hans Belting in Pinotti, *Teorie dell'immagine*, Milano, Raffaello Cortina Editore, 2009, p. 73-75.



Fig. 2- Pacheco, *Cedofeita Shopping Center*, 1976, graphite and black indian ink on tracing paper, 405x437mm

man or observer) and which, in its way, becomes the 'thing', according to a culture. In the present case, the 'thing' becomes the drawings of the architect Rui Pacheco.

However, the medium enhances the visibility of the images should not be confused with the technology in which the medium is found. For example, a technological image can be an immaterial image (without a body), but when the technological medium gives body to the image, the image becomes a material image (shape). The medium is therefore something that materializes the making, proceeding from the action of the body. Therefore, a drawing is 'more' than an image (when it does not yet have a body). A drawing is a material object that results from the operability of making related with a medium, whether technological or not.

The drawings of the architect Rui Pacheco introduce architectural space and in doing so also represent it. This duality, of the perceptive and the imaginative, is embodied in the drawings of this author. Their presence and permanence in a stated context ensures the figuration of their history through memory.

With regard to the issue of consideration and reading, and recognising that the state of visibility is contaminated by speech, we also know that images are therefore 'tainted' by the explicitness that we seek. The ways in which the sign appears differs according to the clarifications of the images, but also according to the degree of knowledge/experience that we have about them and the reasoning that we are able hold about the images. The syntactic framework of signs and their iconographic references provide formal approaches and contents which according to their fruition. The interpretation of these drawings results from the ordering of signs and the articulation of legibility - namely, the signifi-



Fig. 3 - Pacheco, 1991, graphite, black indian ink, color pencil and paint on tracing paper, 305mmx1055mm

cance stated and instructed by the intent of the program. However, this interpretation also acquires signification through the formal situation in which the image is shown. In the first case, the participation of the elements is structural, ruled by contents, in the second case, the presence is the signs provide the shape. The first case tend to be associated with the functionality of the design (architectural communication), the second scenario is usually linked to the artistic need by which drawings are embodied. Hence, the function of the first corresponds to rational rhetoric (rational understanding linked to contents), whereas the second is closer to visibility according to narrative empathy (visual understanding linked to signs). Signs are never 'pure' visual elements, but rather combinations which bring significance and are hence precarious in terms of stability as they require a receptor which turn them in to visible (arte)fact

### 2.1 Creative paradigm

Overall, we seek to understand and considering the author's creative paradigm through their drawings as part of the architectural design. In these drawings project representation refers to a mimesis which is not simply imitation, but rather a particular form of poesis. Poesis in this case is an action of doing (a way of making), following the preservation of continuity with communication with the culture to which it belongs.

Hence, we aim to identify these symbolic drawings, situations and the paradigmatic structures of authorship which are unified in the significance of the work. In our analysis of the architect, Rui Pacheco's drawings, the expression of his instrumental practice as a process is more important than knowledge of the technical rules.

This means that the external inputs, experienced by the individual subject, are incorporated into the design contributing to its development and implementation. In this case, drawing is an activity very close to the concept of praxis. Praxis is understood as somewhere between ideas and nature, a vehicle which unifies these oppositions. Therefore, isolating the function in practical nature of form is a way of reducing the experience of the drawing. The meaning of drawing goes beyond the definition of its program.

The traditional meaning of creativity based on praxis as poetic knowledge (*tecné poietike*) was, in contemporary times, replaced by instrumental rationality of theoretical knowledge (*tecné theoretikè*). From our point of view, the degeneration of practical activity in favour of instrumental technique was achieved by an assertion of power, creating profound cultural adulteration. Thus, we anticipate that the analysis and interpretation of these drawings is a means of acquiring knowledge from a preferably manual and heuristic practice, in other words, the revelation of an original thought, a brand identity. As stated by Vesely, “identity is not a property of things or structures; it is constituted in the continuity of references to the ultimate sameness of the most regular movement in reality as a whole.” (Vesely, 2004: 79). In fact, the author Rui Pacheco accomplishes something new in the execution of his drawings, concerning technique and the discussion of the form. In this way, the identity of this author happened through the process of transforming the world through critical ambiguity (memory) which originates the ‘herein’ of drawing’s creation.<sup>3</sup>

Thus, the cultural expression perceived and made explicit by the author

*Fig. 4 - Pacheco, Praia da Agudela Building, graphite pencil on thin tracing paper, 358x863mm*



becomes empathic experience. The body of the author is present in the empathic mediation of drawing which is developed through the materiality of the instrument, through sensory and cognitive manipulation.

## 2.2 Models

To interpret a drawing is certainly a difficult task, as it is always linked to a subjectivity although neither is it arbitrary. The hermeneutic activity of drawing, whilst interpreted according to the meaning of graphic language, is directly linked to the message, consistent with the rules of a particular epoch, but particularly in reading what makes these images. To aim interpreting the drawing, it is first and foremost necessary to realize the possibility of its exception, to endeavour to find the gesture that indicates the “detour”, to achieve the new – the graphic sign which marks the foresight of a fact, the feature which invokes figuration. All this is ‘to see what has been seen’ by the author, but also ‘to see what has not been seen’, as the possibility of seeing is different for each person and hence all who see a drawing will see something different.

The drawings are graphics feature – marks – roughly inscribed on paper. They depend directly on the author’s observation in relation to the ability to see and understand, promotes what Cicalò called “archives of knowledge.” (Cicalò, 2010: 40). These results from the quantified qualification of seeing, associated with the instrumental capability of research and experimentation of the drawing. Therefore, the scope of drawing is given in the drawing itself, and in the case of the architect Rui Pacheco is almost unlimited. There is a mental and physical capacity, because drawing needs the action of the body in order to be fulfilled.

A drawing requires the energetic availability of the body: alternating rhythms (slow and / or fast), as the expression of the mind and body are revealed in the drawing, the range of which will ultimately be communicated. In this case, the ability to communicate the architectural design drawings, will become perhaps more ‘immediate’ than artistic drawings, because in the second case, the perception of the object is usually easier to ‘identify’. The design cycle, in its connection with drawing, takes ‘shortcuts’, by means of a more ‘concrete’ design representation which is clarified by the program. This does not mean that, in avoiding strictly programmatic forces, the author does not find motives for design.

These drawings, understood as architectural design communication, still raise the question of effectiveness as a skill

(mastery and use). The availability of these drawings depends, of course, of being-skilled, not according to rules defined by the corpus of the Drawing, but rather by its capacity to represent the ambiguity establishing with the project. In fact, the effectiveness of the communication of these drawings reveals itself more in hypothetical “cheating” than in the skill of realistic resolution.

*Fig. 5 - Pacheco, Cairo Building, Egypt, graphite and black indian ink on tracing paper, 635x750mm*



Hence, these images (drawings) are design material par excellence, not only in terms of the validation and evaluation of the project, but also due to the fact that they evoke, organize and imagine the architectural design project, which can be an active milestone of subjectivity, acting and integrating those which ‘attend’.

*Fig. 6 - Pacheco, Cairo Building, Egypt, graphite and black indian ink on tracing paper, 848x583mm*



### 3. Case Study: drawings by Rui Pacheco (1929 -)

Drawings by the architect Rui Pacheco (1929- ), dating from 1959 to 1990, were principally motivated by financial and economic requirements, as a consequence of being newly married and needing economic independence. He moved to the city of Lisbon (St. Amaro de Oeiras) in search of new job opportunities, hoping to better exploit his talents as a gifted draftsman after having graduated in architecture (from School of Fine Arts in Oporto, 1970) at 41 years of age. As examples of his architectural designed and built projects from scratch are rare, his work essentially comprises the extension and enhancement of existing buildings (such as the Church of Joane, Famalicão; the expansion of the Church of Maximinos, Braga; several residences, etc.) and hundreds of drawings visualize and scenically communicate architectures proposed by other authors.



Fig. 7 - Pacheco, Pacheco's student project, graphite pencil on thin tracing paper, 750x930mm

His architectural drawings soon drew the attention of large organizations, project offices, speculators and developers. His first challenges in urban design and architecture, with aerial views integrated into natural landscape (CUF marine, for example) took place in Lisbon, but it was with the architects of Oporto, where he returned in 1961, that most of his work was completed, designing for architects such as Fernando Távora, João Andersen, Joaquim Sampaio, Carlos Loureiro, José Pedras, Carlos Garcia, Rica Gonçalves, Luís Praça and João Castelo Branco, and Rogério Cavaca, amongst others: these are the illustrative images on which we will focus.

Fig. 8 (top)- Pacheco, Foz Building, graphite, black indian ink, color pencil and crayon on tracing paper, 410x555mm



3.1 Dreamed gestures

In a personal interview, Rui Pacheco knows the many hours he spends as a keen cinema-goer as the principal factor which influences his graphical work. He explains that he enjoys viewing a world recreated and staged by set designers, lighting technicians, producers and photographers, then compiled and given sound by the director, creating – on the large scale which is cinema – a world of landscapes which will always be subject to the deformation of conical perspectives and the dramatic density of the scenes.

In fact, what Rui Pacheco seems to want from his architectural designs – apart from the including perspective in buildings (still only imagined) integrating them into urban or rural landscapes, as he reveals plans which augur municipal and public approval whilst fulfilling their functions – is the recreation of emotionally charged scenes, repeating the typical citizens (the worker in a rush, the couple in love, the middle-aged dilettante and others), as they unfold themselves, between the density of gloomy (intensified) skies, and foregrounds that are framed with flowers, on which the argument of visible action is focused.

In acknowledging suggested alterations, or even in changing some of the architectural projects entrusted to him, Rui Pacheco, always draws another project, a place of immersive *heterotopia*, carefully and technically mended, whereby each viewer is invited to partake in experiencing an epiphany.

Through shading and scratching with 0.13mm thick nib, volume is restored to the forms of architecture, emphasizing the convergence of vanishing points, saturating the image with a detailed description that appears to result as if completely by accident. The exertion, physical and of the retina, which contributed to today's clinical blindness, seems to be the result of a stubborn form of repressing natural chance

with artificial drawing, although, paradoxically, the nature represented considerable space in Pacheco's drawings, particularly through marked by the drama of the skies and the lush flora.

The technique displayed by this author, from assembling models of buildings on cardboard, photographing them from carefully selected viewpoints, served as the basis for the detailed design process with the ink pen. At this stage of drawing with the pen, it was possible to correct the vertical perspective. Using transparency and taking advantage of the strength of paper with a high gram weighting, the author developed the use of black line and watercolours to show depths, objects and skies. The resulting technique involved using plastic paint white as the medium, scraped with graphite or a blade. The surprising results of this pictorial work were later photographed for the typographic reproduction and its integration in promotional material.

Iconographic details of the constructed images, allow the return of the author to a space-time of ancestral rurality, simultaneously integrated in the urban environment, a discredited modernism, with models of archaic cars, characters with theatrical poses and gestures, environments saturated with unusual props, constructing an artificial and ornate whole, displaced from the time during which the images were produced. The anachronism of time and fashion justify an autobiographical centrality that imposes itself as a work of poetry, a heterotopic motor for the production of these images. In fact, the author supplied the answer in response to the demand for the construction of an intimate object, whose artistic production is disconnected from a mere preview of architectural approaches, close to an empathic welcoming space to be shared with the observer.

The technical feature applied in these drawings, apparently masked by the terms of the commission, seems to respond to the author's inherent need for living nature, ecologically corresponding to the exercise of its environmental adaptation to the world. If the technical feature shadows the distance, in this case, conversely, it encourages the proximity of empathic experience on the territory.

Hence, it is perhaps possible to compare and find similarities between Pacheco's drawings with those from earlier epochs, such as drawings by Frank Lloyd Wright in the 1940s and Richard Neutra in the 1950s, although there are also distinguishing features.

The idea of architectural ecology invoked by Pacheco's drawings always considers nature as an indispensable factor for human balance, present in various plans of the landscape – or as the heterotopic setting



Fig. 9 - Pacheco, graphite, black indian ink and red pencil on tracing paper 250x597mm

required to balance his own soul – is consistent with the idea presented by R. Neutra in his book, *Survival Through Design* (1954), in justifying biorealism: “It has become imperative that when projecting our physical environment, we consciously consider the question of survival in the broadest sense of the term. Any project that confers or imposes excessive strain on the natural human must be eliminated or modified in accordance with the requirements of our nervous system and, more gradually, from all our physiological activity.” (Neutra, in Pereira, 2011: 212). The implicit position in these discourses considers architecture (and design) as therapeutic agents for a supposedly dysfunctional artificial system (against nature), regulating or normalizing it, and consequently, drawing recognizes as a supra-functionalist function of holistic order.

### 3.2 The dream of achieving reality

The drawings created by the architect Rui Pacheco personify an ideal of space and time, close to that which Michel Foucault defined as *heterotopia*. We are not facing a utopia that idealizes and ‘softens’ a certain space and time, giving them idealized and proclaimed characteristics at the edge of a concrete territory, but rather in a *heterotopic* dimension where the correspondence between idealization and territorial realization seek a place of existence.

Drawings according to a commission whose function is project-disclosure are interpreted as ground of projection, idealized in their contexts and realized in the drawing place.

According to that which M. Foucault defined as heterotopia, these

drawings constitute the possibility of representing a ‘counter-space’. “Children are well aware of these localized utopias. The distant angle of the garden, the attic, or better again, the Indians tent in the center of the attic, and finally, on Thursday, after lunch, the parents’ big bed.” (Foucault, 2004:13). Rui Pacheco’s drawings are also real places, implemented in the drawing through the physical action of the scratching material on the paper, created beyond the likelihood of the built world in reality; they will, therefore, be “mythic and real contestations of the space in which we live.” (Foucault, 2004:14).

In this case, the representations made by Pacheco comprise the most pure and constant *heterotopias*, alternatives that overcome the fiction of representation and the constraints of the commissions from which they originated.

The author does not attempt to give the body a utopian idealization of reality but instead seeks to encounter another reality that in another place, inscribes the body in the object-design. In these drawings, the places and the characters seek to ascend to the real. The places are materialized in the representation of various architectures and their characters inhabit us. In association with the drawings, the characters are identified (appearing with warning or inadvertently), and as they are recognized they are consolidated, evoking the universe of comic-books and cinema, thus humanizing places – places ‘elsewhere’ to which we are carried or are caught. These forbidden places, reserved for the social treatment of individuals in crisis (mental patients, prisoners or, generally, all those to whom deviant behaviour was attributed) are now replaced by the promise of pleasure that images generically advertise. As the ancient places of heterotopia are disappearing (such as the asylums, hospitals, prisons, the barracks, boarding schools, homes for women in the menstrual period or at the time of puberty for boys of primitive societies), the division of ‘elsewhere’ will be incorporated. Paradises are proposed and socially sanctioned, such as closed condominiums or spas or the cinema and the new interactive environments where images are created for the viewer to submerge in them.

The atmospheres created by Rui Pacheco in his drawings have a ‘paused’ relation with time. It would not be possible to identify time, because it is present as a purifier of the action. Time ‘eternalizes’ because it infinitely repeats a perpetuating action, intended to cancel or compensate the reality.



Fig. 10 - Pacheco, *Hotel Parque de Lassaete*, graphite, black pen and indian ink on tracing paper, 380x605mm

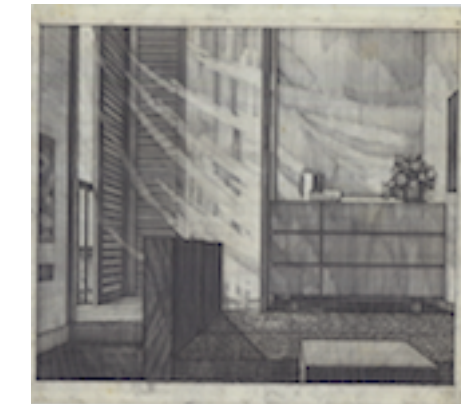


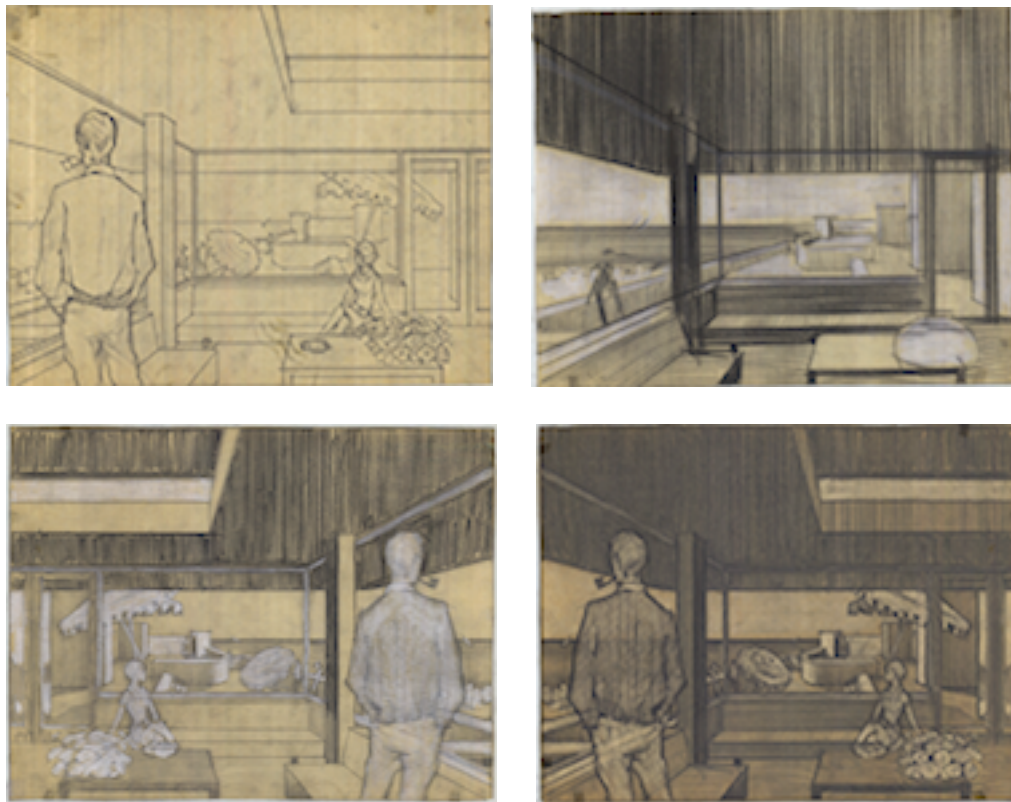
Fig. 11 - Pacheco, *Hotel Garrafão*, graphite and black indian ink on tracing paper, 498x545mm

## 4. Conclusion

With regard to the idealized asceticism, these drawings hold the power to denounce reality as illusory reality, building a constant idealization of the world. To represent the pacification of an articulated and orderly existence, they appeal alternately to the chaotic and unruly world assigns meaning to them.

We look at these designs with the fascination that causes us to see the disordered existence through images that make us dream of the possibility of a place of relief. The reality of the dream departs from utopia when it seeks to be a substitute for reality. Due to their heterotopic condition these drawings question, unsettle reality, compensate for it, neutralize or purify it. These drawings establish the discontinuity between the visible and matter.

That which appears more relevant with regard to the architect, Rui Pacheco's perspective drawings, is not original technology, invented by himself to carry out architectural graphics, nor the heterotopic environments with the social exceptions in their parts, but rather the poetic emergence of his own experience that contaminates the perception of his production – old environments with characters whose narrative escapes the domain of normal trading standards, indifferent to their target market.



Figures 12-1; 12-2; 12-3; 12-4 - Pacheco, Hotel Garrafão, graphite and black indian ink on tracing paper, 408x532mm

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# Netter | Models for sketching in design education

## Abstract

Complex technologies and numerous fields of specialisation demand and distract learners' attention in design education today. In stark contrast to an environment of 'undo' options in software, drawing encourages and reveals the unexpected. As types of drawing discussed in this paper do not require complex tools or specialist knowledge, the sketch can also serve as a democratic means of communication, effectively helping to contribute, explain and identify.

This paper looks to formulate models for sketching towards idea development. These models will facilitate different learners and cultivate chance and serendipity. Research by Rudolph Arnheim, Gabriela Goldschmidt, Dianna Petherbridge, Howard Gardner and others will form the basis from which to analyse the models. Furthermore, the paper aims to connect the contribution of the sketch in the arts, sketching's function as a generative method for idea development and, how the process of sketching informs best practice in design education.

BA (Hons) Graphic Design and Illustration students had been interviewed about how they develop, refine and solidify their ideas and the role of technology in that process. Each of the sketching models had been tested with students and they had been interviewed about their experiences afterwards. Samples of the outcomes are presented as well.

## Biography

Louis Netter is an illustrator and illustration Lecturer at the University of Portsmouth. His research has been focused on the flexibility of drawing to communicate a wide range of human experience in social, political and narrative based works. His illustration work has been published in numerous magazines and his artwork is collected in several major institutions including the Metropolitan Museum of Art, The Library of Congress and the New York Historical Society. He has been a lecturer at Parsons School of Design, SUNY Purchase, The College

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Alexander Tibus is a graphic designer and Lecturer for information design and typography at the University of Portsmouth. He researches on optical illusions in typeface design and time-based typography. His work has been internationally awarded, exhibited and published in several books and design magazines like Creative Review, Novum and others. Since 2010, he has lectured in Egypt, Germany and the UK. Along the way, the information design work of his students was exhibited in Cairo and Berlin. Tibus is a member of the professional bodies IDZ – International Design Centre Berlin and Berliner Gestalten.

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### Definition of terms

This paper defines the term sketching as an immediate, responsive act of idea generation. The definition includes drawn charts and diagrams, as well as textual sketches involving words and language. Because of time restrictions and the nature of the models introduced here, the drawings might be unresolved. Sketching may include ideational drawing or any other visual and textual notation. For the purpose of this research, 'graphic language' does not mean the highly developed 'style' that is characterised by the consistent application of an informed personal vision. The graphic language discussed here involves early, indicative marks and constructions. This may or may not be predictive of later formal language and is more akin to a 'stand-alone' visual shorthand that gives shape to nascent concepts.

### Research question

Evidence suggests that in design education today, students appear to lose the trace of their creative journey. How can specified sketching models reveal the student's creative process and become an effective tool for problem solving?

### Aims of the paper

This paper reflects on the role of sketching in design education today.

It aims to re-introduce the sketch as an effective means of generating ideas early in the design process and, to champion the contribution of drawing in the visualisation of ideas and concepts. This research seeks to reveal for students the potential for articulating ideas more clearly in a kind of drawing that is free from expectations of clarity and skill. This is not to dismiss skill, (and indeed the benefits of rigorously developing those skills) but the aim is to encourage personal, and intuitive drawing. The sketch as it is discussed here is the immediate, even hasty response to an impulse or an idea that finds form in marks on paper.

The paper introduces and analyses three pre-defined but open-ended sketching models. All models utilise basic analogue techniques. That is, they utilise rudimentary drawing implements and paper. Their simplicity and given time constraints avoid distraction and enforce a rapid creative process. The models are narrowly focused and do not require complex tools or specialist knowledge in order to unleash students' creativity, enabling greater focus on idea development. The implementation of the models helps to explore the inherent benefits of drawing in its immediacy and flexibility and, the potential in exploring language as a prompt for visual responses. (Edwards 1988: 39–40) Working within strict time limitations, all three models impress upon the students not to be precious and move quickly from idea to idea. The models are seeking to find freedom in the constraints and to encourage quick thought and action as a means to engender intuitive design thinking. This intends to reduce the anxiety of drawing that might result from striving for perfection, beauty, or finish in a drawing. When practised frequently, the models might also help students to develop a personal graphical language. In addition, they help to preserve the traces of the student's creative journey as they document the idea generation process. This process provides a basis for self-reflection, discussion and sharing of work.

The three sketching models described in this research are not entirely new but are explored here in the context of today's design education practice and how drawing is situated within that practice. As Angela Rogers noted about approaching drawing in higher education 'If teachers in higher education are going to exploit the potential of drawing, they are going to have to model simple, spontaneous and unthreatening methods.' (Rogers 2012: 3) As stated above, the models introduced here seek to address this point by focusing students on drawing that is valued for the quick realisation of ideas and not demonstrable skill.

### Approaching form and visual ideas

What happens during the sketching process is of great importance to

this study and the implications of its findings. Gabriella Goldschmidt's study 'The Dialectics of Sketching' found that this process is 'the oscillation of arguments which brings about a gradual transition of images'. (Goldschmidt 1991: 123) Goldschmidt's study describes architectural designers 'thinking aloud' as they undertook the timed task of designing a library with a provided footprint drawing (ibid.: 124). The study saw designers making 'moves' and 'arguments' which respectively represented two distinct but interrelated steps in the process. In simple terms, the moves represent propositions that are tested as sketches and the arguments were the 'rational utterances' that push the move towards resolution. The results of the study, like the creative process itself, revealed a non-linear and seemingly, non-logical process of idea realisation. It did not follow any demonstrable consistent strategy. Goldschmidt also found in her revealing study that participants made several drawings without understanding necessarily what they were doing until the repetition of the form (or act) brought clarity (ibid.: 123). Irrespective of linearity or logic, the designer 'searches' in sketching and this is most crucial. As Arnheim noted, the 'pregnancy of form' (Arnheim 1996: 71) in the sketch is what the designer seeks and what predicts the final design. These nascent formulations are highly valuable to the student as they give shape to ideas and reveal their graphic imprint. The drawing act itself reveals the creative process and the record of this activity brings the student closer to the machinations of their own thinking.

Aligned with Goldschmidt's observations, Steve Garner saw drawing for designers as 'problem-finding' and drawing as particularly well suited to 'consolidating a theme or thought.' Through case studies of designers from a variety of backgrounds, drawing was identified as a central activity in their design process and a place for dialogue with oneself along with a heightened sense of not just the design problem, but the feedback received from the experience of drawing (Garner 1992: 100–101). This feedback is an essential part of the drawing experience and the sensuality of the experience is not to be understated. It was a consideration of the pilot study of this research and the reason that rudimentary drawing tools were used.

Drawing is, as Rawson states, 'a major imaginative act' that 'projects inner images'. (Rawson 1979, 8) Indeed this imaginative act is in the transformation of marks on paper to the representation of some image. Additionally, Rosand notes about the qualities of drawing:

It (drawing) points to the pictorial representation in the construction of which it participates; on another, in a less spatial and more temporal dimension, it leads not in the direction of illusion but, acknowledging the primary reality of the mark, toward the past of the drawing itself, the moments of its making. (Rosand 2002: 20)

The 'moments of its making' can be seen as the transcript of the designers thinking and can provide a valuable window into the designers intent, visualised in the quick formulations of the sketch. As this research is seeking the generation, advancement, and refinement of ideas in sketching, it needs to demonstrate the significance of the permanent record the sketch provides. As Arnheim notes, 'all abstract thinking relies on some perceptual referent, even the most abstract theme is tied from the beginning to concrete images'. (Arnheim 1996: 71). From early indicative marks that represent thought and predict the final design, the sketch provides the blueprint of core design thinking. It also establishes a kind of visual shorthand that is developed to quickly give shape to ideas, utilising a visual vocabulary of marks. Arnheim further notes 'a sketch is a reflection of the guiding mental image; but it is not, and cannot be, identical with it, and this difference is precisely what makes it a precious instrument for the designer.' (ibid.: 72)

In conclusion, this form of drawing is heavily reliant on memory (recalled images) while the execution represents the student's current applicable skills. The resulting sketches reveal bare design sensibility in both form and content. The continued practice of drawing also builds what Rosand noted was the 'storehouse of the mind'. (Rosand 2002: 90) Those remembered forms, through the consistent practise of drawing, become more refined and reveal the applied visual language of the designer.

#### *The role of the sketch in design*

Sketching provides an intimate communion with the designer's process. From speculative marks to refined, near resolved preparatory drawings, sketches bring a granular understanding of design considerations and 'in-the-moment' propositions that all contribute to the total picture or 'story' of the final design. Rawson saw sketches or 'first thoughts', principally as a demonstration of the considerable skill of the draftsman in imparting the total idea with brevity. He also acknowledged that sketches are the 'bones of design', later to be 'clothed in the flesh of forms'. (Rawson 1969: 294) While this is still seeing the sketch in service of work yet to be completed, there is an acknowledgement that the sketch reveals the latency of artistic intent. Sketching's role as a 'rehearsal of the act of making' is significant and indicates that the performance would improve with practice. (Petherbridge 2010: 28)

Beyond the sketch as a concrete indication of what may be formalized in the future, the sketch and drawing as a whole gives us an intimate look at the record of graphic marks and the punctuations of thought

that can be revelatory to the design student. Petherbridge sees the sketch as 'inviting sequential cognitive and practical procedures' (ibid.: 28). These procedures are often inventions of the form and born in the necessity of the moment. The sketch then suggests possibilities and even tests them. Therefore, the value of the sketch is in its ambiguity. This ambiguity is important because 'one does not want to crystallise ideas too early and freeze design development.' (ibid.: 28).

#### *Motivation and aims of the drawing models*

Ben Shahn spoke of the creative individual working within the higher education system as a challenge to the existing top down model that had little interest in originality, critical thinking and the development of the individual. His idea of 'integration' stated that, (referring to creative production) 'the discipline of formulation is inseparable from the discipline of thinking itself.' (Shahn 1980: 117) Seeking to cultivate the fluid translation from an idea to its visualisation is an aim of creative idea generation. This translation is the summative expression of the designer, the closest connection between mind and hand, even when mediated between a technological interface.

Jürgen Huber, Professor for typography at the HTW Berlin in Germany, stated in an interview, that few students that start higher education design degrees can draw and that the trend is towards less skilled students. Although he does not see drawing as an 'essential skill' of design he notes:

I see drawing not as an essential skill to study communication design, but it is striking that this manual element decreases more and more. One thing is the hand, the other the head. And we as educators always have to try to bring the two together. (Kuppinger and Matthies: 2013)

The mind and hand synchronicity is essential and provides the student with agility in the dissemination of their ideas. Further, the models describe here work without a technological intermediary, enabling the student to see the totality of their thinking unpolished by sophisticated software applications. When Huber was asked in an earlier interview regarding the frequent rumblings about the decline of standards in higher education, he speaks of the current technological culture saying:

Due to the passivity we can encounter in media nowadays – we do not have to approach them actively, we can face them passively – our own creativity decreases. I do not have to conceive a creative way to pass time any longer, but I can flop on the couch and let the television, the internet or a video game wash over me. (Gabrowitsch: 2007)

The pervasiveness of technology today in all parts of daily life creates a need for the tactile qualities of drawing for the very reason that it is not

passively engaged with. But drawing and its significance to the designer is much richer than just as a tool for communication. As Steven Garner found in his case study of several designers and how drawing was situated in their practice he notes ‘drawing necessitates creativity, often a private activity’ and that many of the designers interviewed created many drawings that would never be seen. (Garner 1992: 99) Therefore, like the models presented here, drawing was used as a means to ‘explore’ and ‘manipulate’ ideas in the dialogic process of drawing (ibid.) The process of drawing is then a multifaceted experience, in which practitioners see great value, not just in terms of end result design products but, in the potentiality of drawing for wider knowledge.

The models introduced here are intended to facilitate different kind of learners and combine visual and verbal thinking, activating and training both brain hemispheres in order to reach creative solutions (Edwards 1988: 11–15). Students that recognise the value of drawing in the form of a simple, playful and fast idea generation technique might be able to develop their personal graphic language. They can gain confidence in contributing their visual ideas to discussions or to support verbal statements through sketching.

The interplay of language and drawing is crucial to this study. Written words and drawings regularly occupy the same space within student sketchbooks. That is why both are considered in the models introduced here. As Angela Rogers states ‘the extent to which visual imagery is more ambiguous than text or speech is up for debate, as it is unlikely that the verbal or the visual operate in isolation from each other.’ She also adds:

Everyday interaction however, indicates that visual imagery has ambiguity. As a tool for reflection and dialogue, this ambiguity is useful. Because the meaning of an image, a drawing, isn’t necessarily immediately apparent, in conversation the drawer can disclose as much as they want, when they want. (Rogers 2012: 3 )

The conversation mentioned above is an important part of the three models. The democratization of the sketch and the design process is a crucial goal. The three models are designed to work individually or in conjunction with each other.

#### **Descriptions and purpose of the models**

The generation of digital natives, moving away from hands-on techniques, do not see the difference between digital tools and traditional tools and nor should they. A growing trend however, is that students seek to resolve design problems in sophisticated software and loose

the trace of their activity, the ‘story’ of their creative journey. Student sketchbooks show less and less visualised thinking as they are finding and modifying ideas. There is a growing lack of interpretations towards a certain concept. Students tend more and more to run with an early, ordinary idea that they modify and polish with the help of software. The models introduced here aim to facilitate a focused creative process without digital distractions. They support the generation of multiple variations of an idea as well as creative thinking. This is an alternative to the application of ‘quick fix’ software effects.

#### **Model 1: Free associative sketching**

Students were encouraged to sketch as many ideas as they could and to keep moving, using drawing exclusively. When students are asked to brainstorm on a given subject, there is a tendency to develop ideas with project fulfilment at the forefront of their thinking. In contrast, this model encourages a sideways approach to looking at a subject. The reason why it excludes text is that pure drawn imagery reveals thought differently than in combination with text. Regarding the thought processes of drawing and writing, Edwards observes:

Nevertheless, these styles of thinking are fundamentally different and can cause each mode, in a sense, to view reality in its own way. (Edwards 1988: 11)

Additionally, the concept of ‘free association’, encourages free movement from related concepts to one-offs, as well as narratives through drawing. A crucial aspect of this model is that ideas can be large, small, atmospheric, conceptual or textural. Freud developed free association as a way of garnering unfiltered, uncensored thought that could reveal a patient’s emotional and cognitive state. Here, the use of free association is more about the immediacy of thought and an intuitive and even impulsive response to the subject. This would ideally result in the visualisation of unfiltered thought.

#### **Model 2: Visual and textual taxonomy**

This model had students dividing their paper horizontally into four sections and labelling them on the left hand side:

Synonym  
Typography  
Pictogram/symbol  
Illustration  
(Fig. 1 (overleaf))

Students were encouraged to fill the sections with as many sketches and words as they can, and to move over to a different section if they

became stuck. This model is meant to encourage the quick development of images and words that relate to the larger subject and generate core design components. It aims to activate both hemispheres of the brain, the visual and the textual.

That is not to say that the visual system is better, morally or otherwise, than the verbal system. But the two systems *are* different. And when trained as equal partners, one mode of thinking enhances the other, and together the two modes can release human creativity. (Edwards 1988: 8)

Whereas Edwards suggests separating the act of drawing from any verbal activities, this model combines the two. The purpose of this is to facilitate cross-pollination between visual and verbal ideas. The textual inspires the visual and vice versa. Therefore, the model utilises four different forms of representation as described earlier. Those different categories help to accumulate a wealth of interpretations of a given topic. They are also meant to avoid students getting blocked at a certain section as they are encouraged to freely move between different forms of representation.

#### **Model 3: Free associative word sketch**

This model is the textual twin of the first model. Students were asked to write down as many words and phrases as they can without applying a particular structure.

Since Model 1 allows drawing only and Model 2 seeks to merge visual and textual, it is only logical to base Model 3 on text only. While we have all used and encouraged the use of mind mapping and spider diagrams in our teaching practise, this model seeks to encourage words and language that advance visual ideas not normally generated, using solution oriented brain storming activities. Different from classic brain storming techniques, this model seeks to dissolve the necessity for an order of ideas and, forms a text-based alternative of Model 1. It intends to freely move from related words or phrases to one-offs as well as to narratives.

#### **Time constraints and execution**

The time limits imposed in all sketching models are meant to inspire quick thinking and quick action. In order to cultivate serendipitous thought and action (drawn marks), it is essential to limit the time. This avoids fussiness and the prolonged focus on singular ideas. Although it was not an expectation of this study to see students working gesturally, it was encouraged and future testing of the models may limit time further to push this aspect. The gestural line is important because it speaks to the desire for the student to start to see the marks that can



Figure 1 – example for the structure of Model 1

<p>LIZZIE HUG 27/6/13</p>	<h1>REVOLUTION</h1>
<p>synonym</p>	<p>rebel, shout, movement, protest, stand-up, strength, majority, minority group, <del>rebel</del> revolt</p>
<p>typography</p>	<p>Revolution    <b>REVOLUTION</b>    <b>REVOLUTION</b> revolution    revolution    <del>revolution</del> revolution Revolution    <del>revolution</del>    <del>revolution</del>    revolution... Revolution    <b>Revolution</b></p>
<p>pictogram/ symbol</p>	
<p>illustration</p>	

indicate nascent graphic language.

Kimon Nicolaides was dismissive of the quick sketch and anything sketchy as ‘bad practice’. (Nicolaides 2008: 14) What he really disliked was haste without completion, but he was in fact a serious advocate of the gesture. He said of the gesture that his students were often ‘quite surprised by the results’ because in his words ‘The gesture is a feeler which reaches out and guides them (students) to knowledge.’ He noted that this surprise on the part of the students was because the gesture can be ‘accidentally’ found. (ibid.: 14). The gesture is then a guide to the resolution of forms and indicative of some perceptual truth that we can discern. Nicolaides also encouraged students in their gesture drawing by saying ‘Most of the time your instinct will guide you, sometimes guide you the better...’ (ibid.: 17) If we are encouraging an intuitive and responsive approach to the sketch, it would seem the gesture should be at the heart of that.

Baudelaire, commenting on Delacroix’s often quoted bold contention about the necessary skill of being able to draw someone as they fall out of a window, elaborated on the intent of Delacroix’s statement as a strive ‘to achieve an execution quick and sure enough to prevent the smallest particle of the intensity of action or idea from evaporating.’ (Baudelaire 1995: 62) While the gesture drawing of master artists reveals virtuosic skill through the graceful articulation of complex forms, the act of gesture drawing reveals for the student innate visual thinking and articulation. Because the gesture is rendered so quickly, forms are articulated with the utmost haste and economy. These economical lines, sometimes raw and still seeking form, reveal the artists own strategy for rendering forms. Here we can start to see and encourage as Rosand identifies the artist’s ‘ductus’ and the ‘graphic declaration of the presence of a particular persona.’ (Rosand 2002: 18) This indelibly personal language is at the core of a mature designer’s imprint and is one of the most meaningful educational gifts for the designer. Rosand states:

And it is in the immediacy and indeterminacy of the sketch rather than in the studied closure of the finished drawing that character is most legible; in the spontaneity of the instinctively drawn line, uncorrected and unpolished, is revealed the personal gesture of the inventing hand.’ (ibid.: 22)

The ‘story’ that the sketching models are seeking to reveal relies heavily on cultivating the momentary, intuitive and inventive aspect of sketching and idea generation and, emphasizing the journey without the pressure of resolution. If the sketch is seen as more speculative, its practise can thrive without the expectation of resolution. If we can foster the generation of multiple speculations in sketches, it is reasonable to

suggest that some of those ideas in isolation or in combination could constitute stronger and less contrived ideas.

#### **Setting of the experiment**

The models have been tested with year two and year three Graphic Design and Illustration BA (Hons) students. The available tools for all models were an assortment of drawing implements and paper. The students were shown an example for each model that used prompts different from those that were given to them. The time restrictions were 30 minutes for Model 1 and Model 2 (‘free associative sketching’ and ‘visual and textual taxonomy’) and 15 minutes for Model 3 (‘free associative word sketch’). The instructions and tasks had been handed out on paper as following. The descriptions were given out one after another at the beginning of each task.

##### Instructions

Use A3 sheets. Do not try to create ‘beautiful’ or ‘sophisticated’ drawings, better work quickly. Read the instructions below carefully. You will be shown examples for each after.

##### Model 1

Visualised consciousness

- Draw anything you associate with the given term, anything crossing your mind.
- The topics you draw might be inspire each other but can also be self-contained.
- Term: ‘Evolution’.

##### Model 2

From textual to pictorial

- Separate your sheet horizontally into four sections. Label them on the left hand side: The first section is ‘synonym’, the second ‘typography’, the third ‘pictogram/symbol’ and the last ‘illustration’ (see example).
- Write/sketch as many ideas as you can. If you get stuck in a certain section, just move on to another.
- Term: ‘Revolution’.

##### Model 3

Pictured in language

- Write down words and phrases you associate with the given term.
- Use words and language that describe the visual or such that could be visualised. For example: Instead of the word ‘freedom’ which is quite abstract, you might write ‘wings’, and/or ‘unchain’.
- Write down as much as you can. A particular structure like in a mind map is not required at all.
- Term: ‘Censorship’.

#### **Observations during experiments and interviews with the students**

It was noted that several students were stopping to think and not continually working. This occurred during all models. This might indicate

that prior, solution oriented sketching was creeping in or, that the fluent sketching processes were interrupted by self-reflection on the part of the student. This could be perceived when students had been working on Model 1, which employs sketching only. Additionally, when working on Model 2, students tended to regularly interrupt their sketching activity and seemed to be deep in concentration. This might have been a reflective process in order to find solutions for one or more of the four given criteria (shifting mental gears, as it were). In regards to Model 3, students instead worked quickly and continually. The given time of 15 minutes (which was half the time of the previous models) may have encouraged this on-task behaviour. On the other hand, students are probably more familiar with text based brain-storming techniques used widely in their studies as well as earlier in their school education.

Also, the idea of analogue sketching as a process without any distraction by digital media seems to be a challenge, as several students left their smart phones on the table and even stayed connected to them with ear plugs. Concerning Model 1, their focus on visual ideas might be distracted by text in music they listen to. Other (textual) distractions from smart phones may have also played a role.

Theoretic speculation differs from the observations during this pilot study. Still, looking at the student’s outcomes, their opinions in the interviews, and their descriptions of their creative journeys, the models seemed to stiate a wealth of different ideas and also facilitate different types of learners. The models strive to align with Gardner’s aims for his Arts PROPEL project. That is, targeting the three competences of production, perception and reflection. (Gardner 2006: 156–157) Further testing would significantly increase the role of reflection, especially in terms of the creative potential of the models.

For future research and testing, the time constraints might be adjusted and limited more tightly in Model 1 and Model 2. Also, altering the order of the Models in the experiments might be worth trying. Since the given order of the Models in our pilot study was Model 1 – Model 2 – Model 3, the question arises: Would the students’ opinion of the models, their outcomes and their creative journey change if the order of the models is modified?

Students were asked the following questions:

In your work, do you sketch?

And how?

Which sketching model yielded the most significant results?

And could you imagine using one or a combination of the models in the future?

So do you think all three of them or specifically one or two?

Responses to the question ‘Which sketching model yielded the most significant results?’ was diversified. Model 1 was described as providing freedom in the sketching process:

‘It (Model 1) was the most free one. (...) I acted most freely in the first one. (Athanasios, year 3 Graphic Design)  
(Fig. 2 overleaf)

‘The first one we did. It was just more free. Because I tend to write stuff just with sketching.’ (Sam, year 3 Graphic Design)  
(Fig. 3 on following pages)

Model 2 seemed to polarise the students, as their opinions had been split.

‘Personally, I think it was probably the second model (Model 2) with the grid structure on it. I think it allows you to explore more possibilities in terms of accessing different parts or different ideas (...) you are essentially exploring different models of sketching in one model. You are not restricting yourself to one visual style and it allows you to visualise how things could develop in different areas.’ (Mat, year 3 Graphic Design) (Fig. 4 on following pages)

‘I guess the second one. Because we had to look out for different options. (...) I think if we did something like that in our research process the whole development would be wider and probably more successful for the development of the project.’ (Paulina, year 3 Graphic Design)  
(Fig. 5 on following pages)

Particularly what the two students cited here describe as an advantage had been seen as a hurdle by others:

‘I always struggled with the second one (Model 2) only because I got stuck on one idea and then trying to get this one idea across all four.’ (Oly, year 3 Graphic Design)  
(Fig. 6 on following pages)

‘And I don’t really like the third one (Model 2) this much because I don’t know this many words (laughs) and I don’t really like typography that much.’ (Lucinda, year 2 illustration)  
(Fig. 7 on following pages)

Also Model 3 was considered as being the most appropriate to generate ideas by two students:

‘My favourite one is the one with the pictures (Model 1) but I think... the word one (Model 3) ... probably got the most ideas out of it. So that’s probably better.’ (Lucinda, year 2 illustration)

(Fig. 8 on following pages)

(Fig. 9 on following pages)

‘I think brainstorming or the word association (Model 3) is usually the most helpful. Because then I can develop my ideas quicker and come up

with new ideas and more ideas in a shorter space of time rather.’ (Reece, year 3 Graphic Design)  
(Fig. 10 on following pages)

### Conclusion

Considering the small scope of this pilot study, it is not possible to draw conclusive findings and or present a demonstrably superior strategy for idea generation with design students yet. To demonstrate the individual strengths and weaknesses of the models there needs to be wider participation over a longer period of time and a more robust and informed means of assessing student engagement of the models. Several areas of improvement and expansion of this study have been identified below.

It was also clear that for the models to perform as intended, their specific function and purpose needed to be clearer. To briefly present ‘free associative sketching’ in Model 1 is to limit its impact and tangible, practical meaning to the student. Based on the feedback and visual work of the students, it is plausible that the intended richness of intuitive, on-the-spot thinking through drawing was not fully explored or even understood. This would be re-framed or re-presented to future participants. To gauge the success or failure of the re-framing or re-presenting there would be a simple questionnaire which could be handed out after the exercise.

The questions asked in the experiment described in this paper must be varied, as they reveal only parts of the desired information only. During the pilot study, certain aspects of sketching and the respective value of the process became clearer and therefore a more significant focus. It became obvious that the questions students had been asked did not sufficiently address the notion of surprise or the unexpected in their sketching and thinking. As described in the preceding research, this is a significant characteristic to drawing. Additionally, the idea of cultivating a personal graphic language is also a compelling feature of drawing practice. Because this pilot did not extend beyond one session, this kind of development could not be discerned. Future testing and assessment of the models would look more closely at both these unique features of drawing practice.

Students’ comments and their behaviour during the testing of the models revealed that they felt comfortable with the word-based Model 3. Looking at the outcomes, it can be argued if this model really yields unexpected results. Compared to Model 1 and 2, it is rather linear. Moreover, a process of revelation is hardly happening: Differently to drawings (Model 1), words are not gradually emerging but simply

written down after they come to mind. Cross-pollination of textual and visual concepts (Model 2) also does not happen in Model 3 as it is purely text-based. Students might feel comfortable with Model 3 as it is familiar to existing brainstorming techniques like mind maps and spider diagrams. Model 3 is a useful but potentially generic method to collect ideas and as mentioned below, requires the student to fully embrace the tenants of ‘free association’ for truly unexpected results.

The negative opinions of few students about Model 2 could result from the fact that certain methods are not suitable for specific types of learners (or different courses; i.e. illustration students seemed particularly less interested in typography). However, students could equally feel uncomfortable with being pushed out of their comfort zones. This is where unexpected results might start to develop and outstanding ideas emerge. Leaving personal routines and applying unfamiliar methods can lead to extraordinary, unexpected results.

Nevertheless, the students considered the models as being ‘quite an interesting thing’, ‘important’, ‘very important’ or even ‘a necessity’. One of the year 3 Graphic Design students stated that by applying the models ‘the whole development would be wider and probably more successful for the development of the project.’ This is encouraging and demonstrates that there may be value in early implementation of the models to encourage more sketching in developmental design work. Also, the models offer a way to explore ideas by drawing sketches in a fast and playful way. An alternative to the application of software tools on fewer, more contrived concepts. Teaching the models is a quick process with few instructions only although they may take practice to show effectiveness. Students can quickly develop fluency with them whereas learning complex design software is an essential, but a lengthy and not always intuitive process.

Ultimately, the aim would be to test and refine the models more. They should be implemented into teaching in a project-related context so that progress can be charted from the beginning to the end. The results would help tutors gain insight into the students creative process, their way of creative thinking and, help to support them developing their personal graphic language as well as advancing their idea generation. Drawing within the constrained but open-ended models can reveal unexpected associations and concepts. Adopting the models can reveal visual thinking and help develop a focused and effective idea generation process.

Fig 2 – student's outcome of Model 1

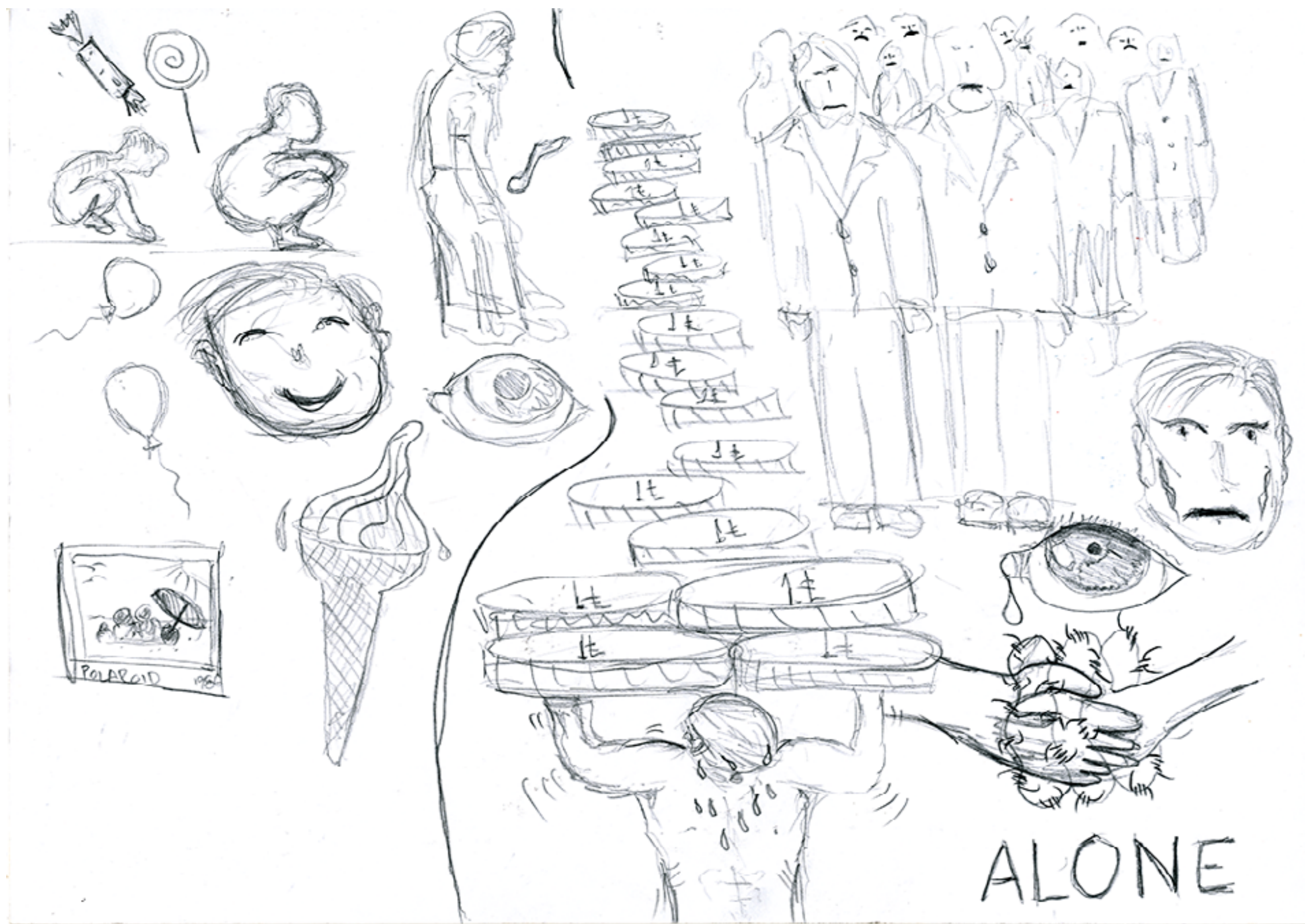


Fig. 3 – student's outcome of Model 1



Fig. 4 – student's outcome of Model 2



Fig. 5 – student's outcome of Model 2

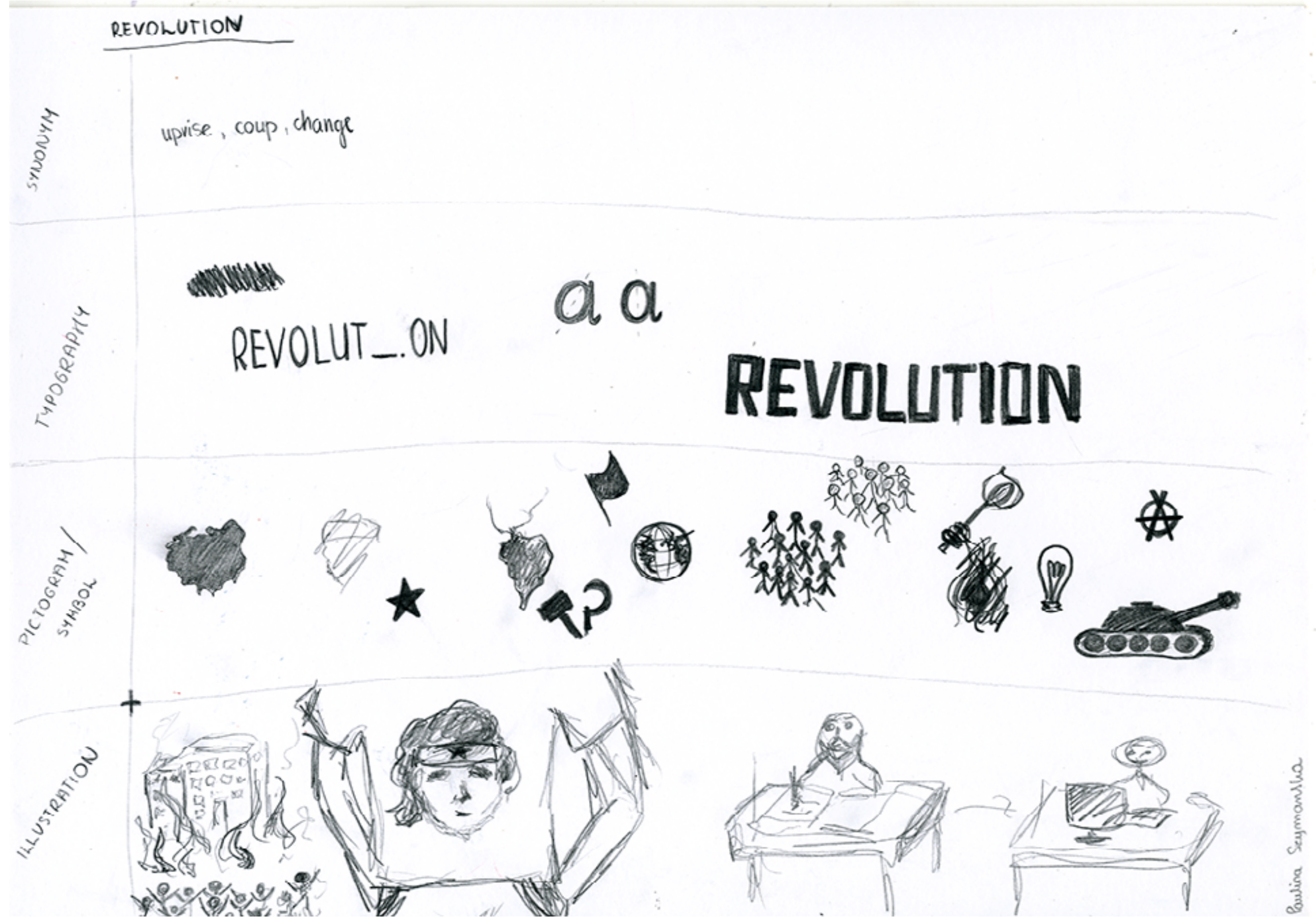


Fig. 6 – student's outcome of Model 2

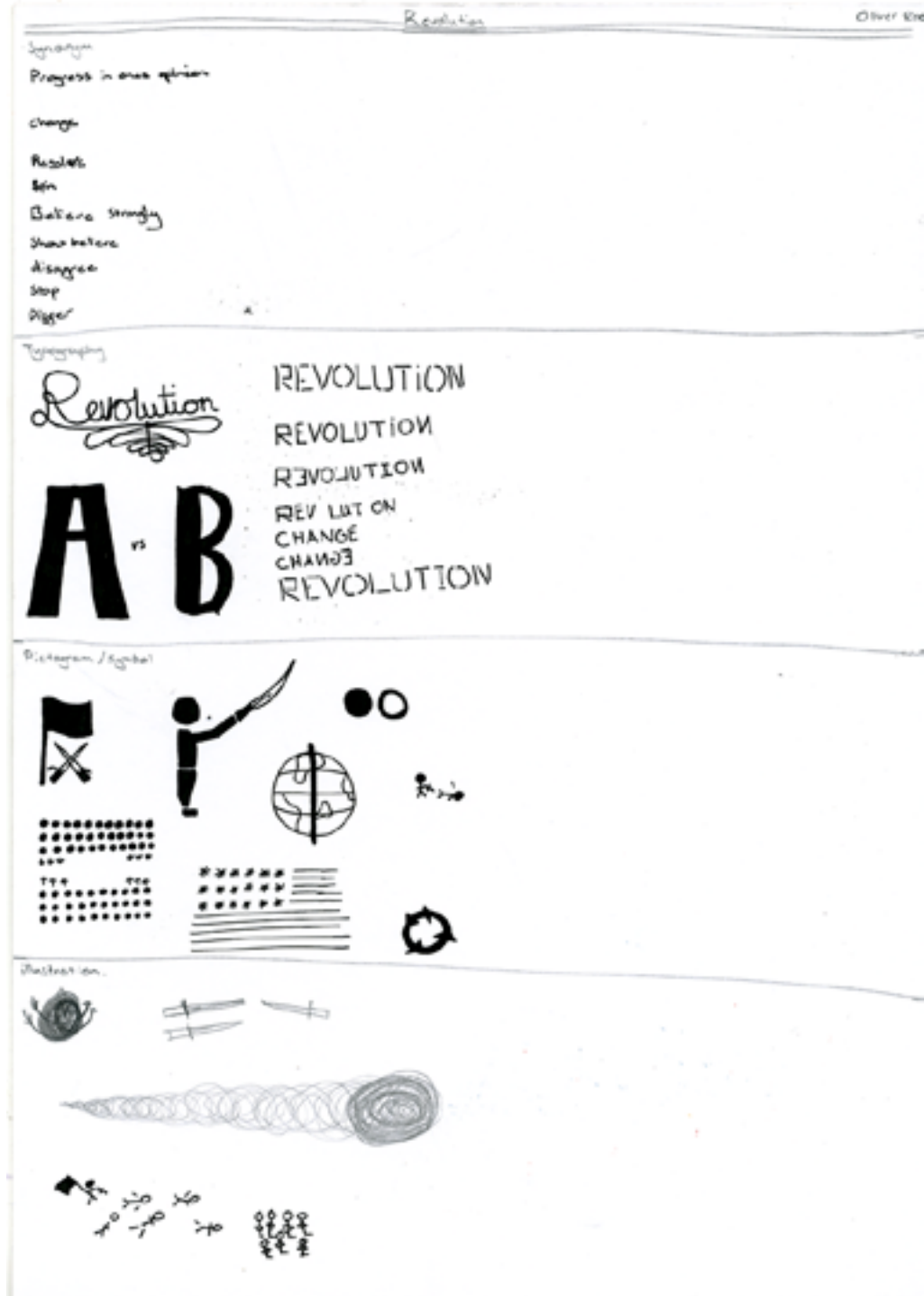


Fig. 7 – student's outcome of Model 2

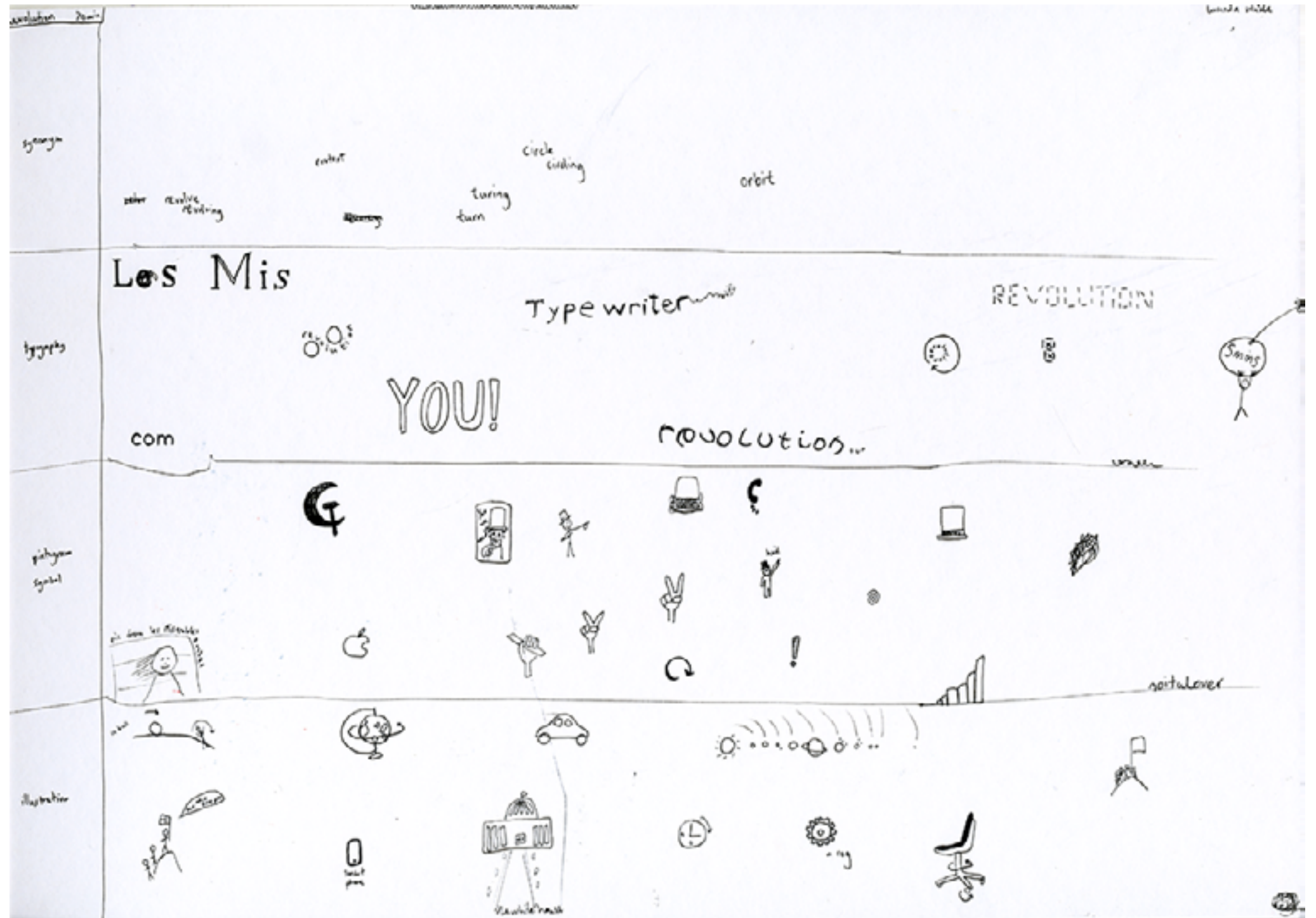




Fig. 8 – student's outcome of Model 1



Fig. 9 - student's outcome of Model 3

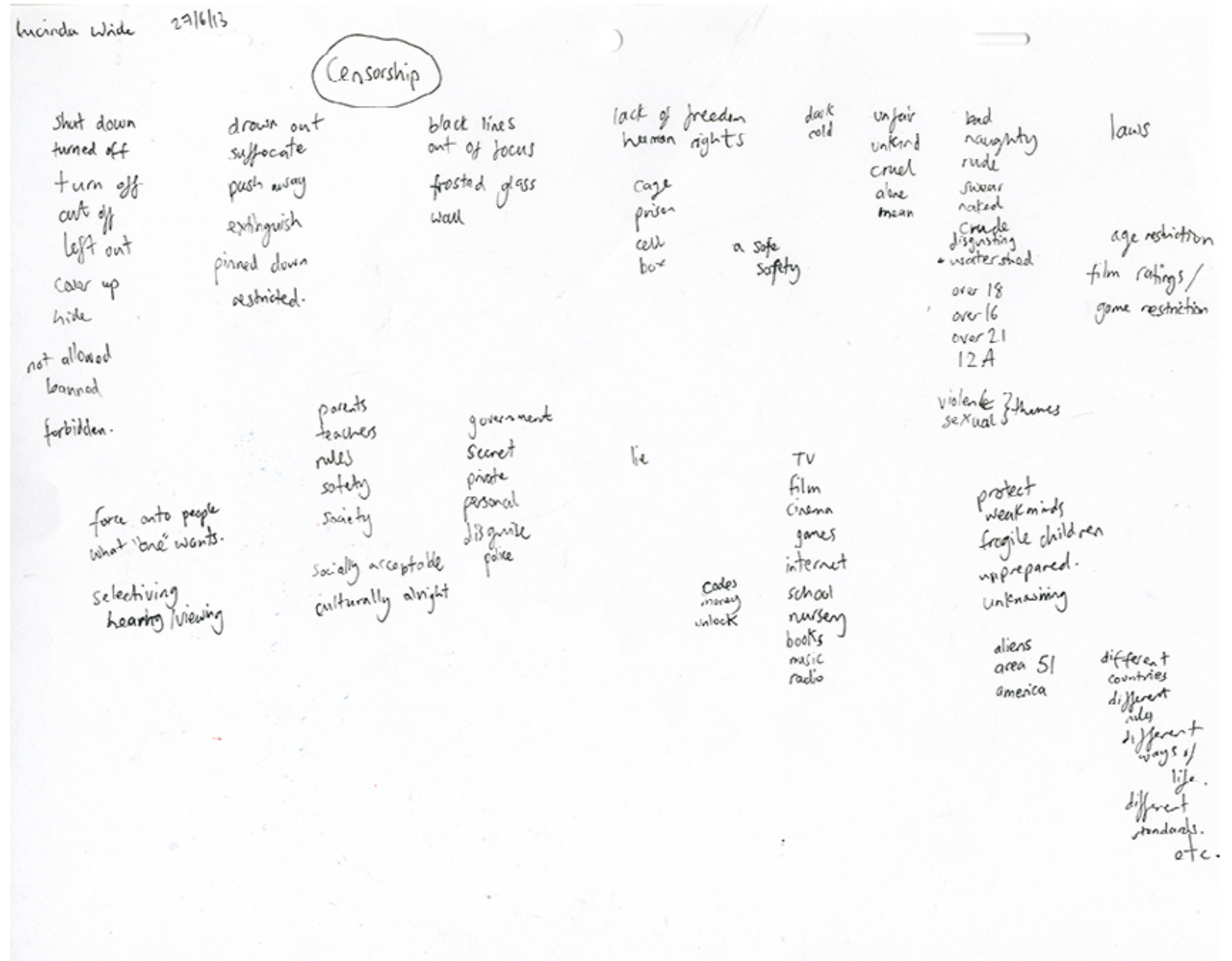
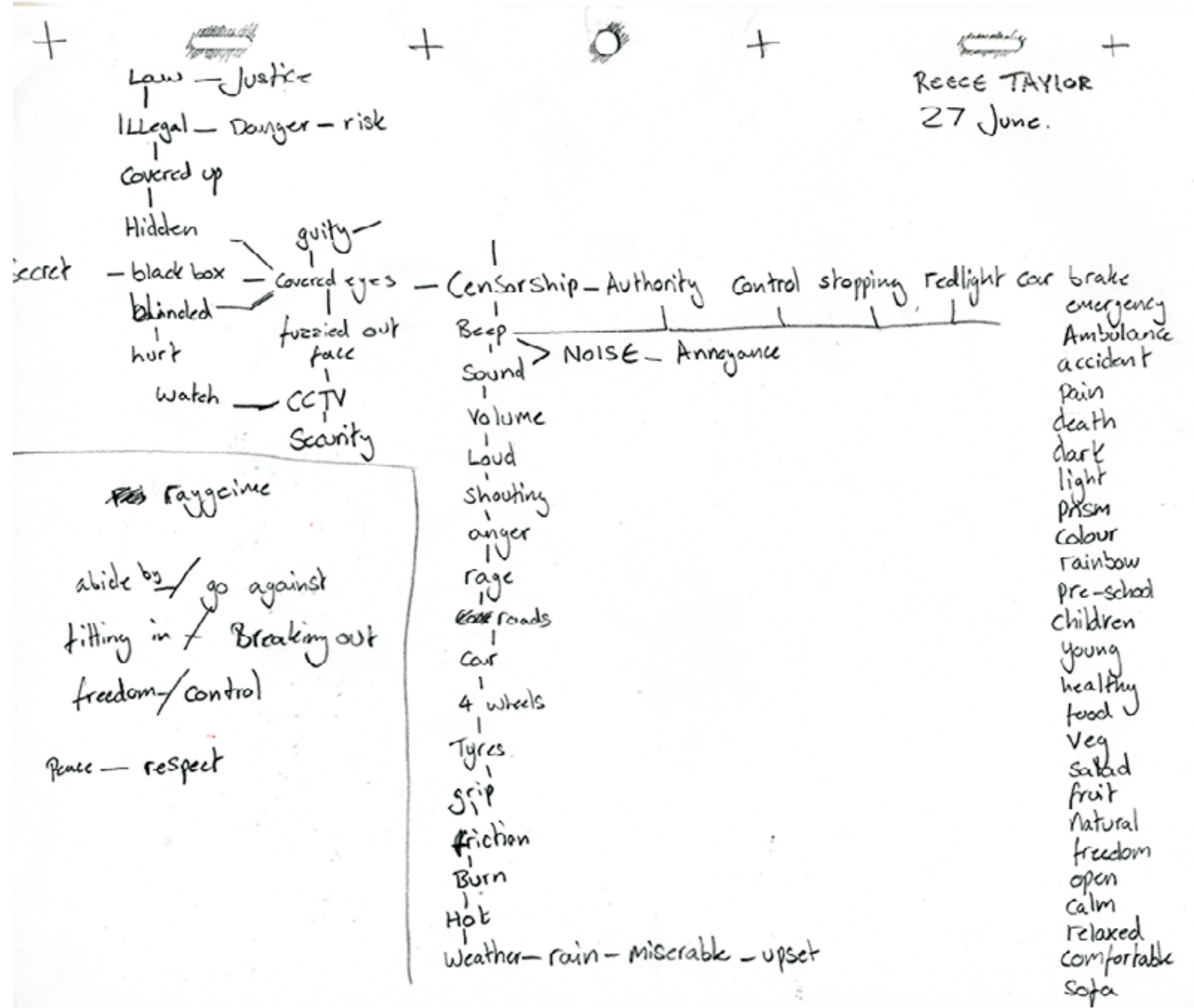


Fig. 10 - student's outcome of Model 3



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# Pelayo + Lopes | Architecting through freehand drawing

## Abstract

Oporto University in Portugal has developed in the second half of the XX century a unique and original course in architecture at Faculdade de Arquitetura da Universidade do Porto (FAUP) that bases itself on freehand drawing. This communication focuses on how this singular teaching-learning architecture approach not only raises pertinent questions within drawing research but also can provide rich inspiration for transdisciplinary and ecologically valid research approaches to drawing or as an interesting case study in terms of the development of visual intelligence or cognitive processes associated with mental image processing development. The communication goes through the FAUP curriculum organization showing how drawing is used in almost all its disciplines, either practical or theoretical. Explanation of the type of exercises conducted in the eight hours/week practice of eyeballing drawing during the first year in Drawing 1, and how it provides students a strong and comprehensive representational drawing skills development will be provided. An analysis of the pedagogical methods of the FAUP drawing course is offered in terms of how it differentiates from both, the academic teaching paradigm and the modern one, raising questions about if it's possible to surpass the paradoxes actual art teaching deals with in a world increasingly digital.

## Biographical Details

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## Introduction

A central issue today, in an increasing global world, is the phenomena of communication. Globalization seems to support itself on the development of new technologies and the latest digital ones have produced the so called digital world. These technologies are based in the invention of a new coding system, the binary code that is so abstract that works as a powerful translator capable of translating any previous code, be it the alphabet, the decimal system, geometric systems or music notation in a single platform.

Not such powerful tool had ever been invented, meaning that before its application to computers each of the codes worked fairly isolated one from another, giving birth to a multitude of coexisting different abstract worlds that formed the specialized culture of industrialization. Frontiers between these self contained worlds have fallen, once this new code is capable of translating the most complex of codes into two digits, resulting in the emergence of an information universe, known as the digital world that is changing our lives. Educational systems all over the world are making an important effort to adapt to this increasingly globalized and virtualized reality. Spotting concepts and believes that became inadequate or ineffective in the new circumstances is an urgent task for research in general as well as reflecting upon singular pedagogical experiences.

Art education is one of the fields where these recent changes are felt in a more acute way, and within this larger field, architecture is an educational ground where these issues arise very sharply, for its exemplary but defiant character. Today architecture teaching is a field in which computing is extensively gaining ground, changing completely the way it used to be learnt and practiced. Reasons for such a change lie upon the fact that digital revolution found a teaching field that had almost completely abandoned freehand drawing from observation. The process that replaced academic representation based model for a semi-otic modernist teaching model - that is abstract by nature and reduces

drawing to a communicational language - started within modernism and spread worldwide after the Second World War (Pelayo 2012). Modernism looks at drawing as a language, i.e. reduces it to a code made of points, traces or surfaces in a plane, as postulated by Kandinsky in the very early XX century. This so called language pursues a strictly effective communication, limiting the scope of drawing by excluding its mental conception power and ignoring it is part of the mind's thinking process, once what we see is mind constructed.

In architecture teaching the modern paradigm meant that all the drawing an architect needed to know was the geometrical representational systems. The arrival of digital tools led most architecture schools to give up freehand drawing, once computers quickly and accurately produce that kind of pre-programmed images. Architecture is a wide ranging discipline characterized by complexity. Its teaching demands the development of many different skills. Worldwide university schools offer today different teaching focuses, but rarely on drawing. In this context, the Faculty of Architecture of Oporto University (FAUP) in Portugal is a singular case that escaped the typical modernist teaching paradigm, and turned out to develop different pedagogical practices.

## FAUP curriculum

The initially very small school based its pedagogical stand on the architect studio like practice. The curriculum has organized itself around the idea of offering students an experience based practice, which consists in proposing project challenges to students and letting them solve the problems it poses by trial and error, taking all the time the task asks for. Theoretical issues are satellite and summoned to this core practice of trying to conceive a certain building(s). To support the pedagogical work of trial and error professors rely on all procedural handmade drawings made by students during the process, and from which they can follow the evolution of the conceiving mental processes used by students solving the problems emerging from the exercise, till the final solution is achieved. This methodology embraces a personalized pedagogy that focuses on the student, not on the knowledge and stands against industrialism acceleration. This characteristic can generally be explained by the late and weak industrialization of Portugal.

The change of paradigm from the obsolete academic practices to the modernist ones occurred quite late in Portugal, comparing with other European countries. In the end of the 60s, two young artists, newly graduated in painting and sculpture, critics of the still very academic pedagogy they had at the art school, were contracted to teach drawing at the Oporto school of architecture. They were given the opportunity and

liberty to develop a different approach to teaching drawing that suited the overall pedagogical frame that the “new school” of architecture was then wishing to wager on, almost by scratch. The revolutionary ambiance at the school in those years almost paralyzed it and it only stabilized in the middle seventies, when the country changed from a dictatorial regime to a democratic one, but eased testing and conducting pedagogic experiments.

The leader of the group was the Portuguese contemporary artist Alberto Carneiro, just arrived from Saint Martin’s School of Art in London. There he contacted with the new artistic trends emerging in the late 1960s, notably with the British Conceptual and Minimal Art. He, and later António Quadros, started to practice a very experimental pedagogy that laid on the idea of using drawing to awake the senses. These pedagogic experiments caused quite a big impact on the students at those times and ended up launching the foundations of the new pedagogical path that has been followed and developed ever since by FAUP.

The structural idea is again focusing in the student as the actor of his own learning. Drawing should provide students the experiencing of the sensorial/mental body towards interaction with the existing world, and also be the instrument/practice of envisioning the possibilities of a “world to be”. The first experimental years of FAUP gave rise to the current consolidated drawing curriculum that transformed drawing in the bedrock of the entire course, without which students cannot advance in other important disciplines, once many of them ask for drawing skills frequently – even some of the theoretical ones. The effect of the dissemination of digital tools at FAUP didn’t create the impact we saw in other architecture schools. It made the school slightly tremble but stand reinforced. A reaffirmation of FAUP curriculum and a stronger identity is what came out of the Bologna agreement application. In fact, there are almost no semiannual courses in the curriculum and no use of digital technology during the first two years of the course.

#### ***The drawing pedagogy at FAUP***

There are two mandatory annual courses of drawing at FAUP the Desenho 1 (Drawing 1) in the first year, and Desenho 2 (Drawing 2) in the second year. Drawing 1 concerns observational freehand drawing and Drawing 2 concerns the use of freehand drawing in architecture practices and has less than half of the time available to Drawing 1. This paper will go through Drawing 1 because its drawing teaching is more general and doesn’t confine itself to the area of architecture.

Drawing 1 contemplates an 8 hours/week practice of freehand observa-

tional drawing. The objective of the course is to lead students to learn how to effectively and intelligently draw from observation and classes are divided in alternating studio classes for object representation and street classes for space representation. For each class one space or object(s) is selected to serve as the drawing model. Today eight classes of an average of 30 students take place twice a week and each one has a total duration of four hours. The classes are very demanding, for students and teachers alike, once the eyeballing drawing exercises are all done at the same time under the professor supervision and always with limit controlled time. A minimum average of 5 drawings is produced in a class or more and in the end of the year students have produced a minimum average of 300 drawings according to four different types of observational drawing.

The course is divided in three stages fairly equal in duration. The first stage aims to introduce basic mental procedures in observational drawing and it’s philosophy is mainly analytical but diverges from the early or late academic methods once it’s informed by cognitive mechanisms processing visual and sensorial information. At this phase all exercises spend the same time: around 20 to 30 minutes each. All drawings are individually made but they all represent the same model from different viewpoints around it. In every class, for one two, or even three times, drawings once done are exhibited in a wall, observed by students and commented by the teacher during the class. This allows students to focus on learning how to capture, select and manage visual information as well as the important visual cues in their graphic representation, and also to become aware of the unconscious drawing constructive strategies each student used. Because no importance is given to technique, graphite pencils are the only tool at this stage, and to get readable drawings in terms of their constructive process no rubber use is allowed.

The second stage of Drawing 1 introduces four different kinds of attitudes toward observational drawing that produces drawings with distinct characters. The quick sketch varies between 5 seconds to 2 minutes; the sketch is a 20 to 30 minutes drawing; the detail drawing takes a minimum of one hour up to two and the contour drawing is 20 to 30 minutes long. All the four kinds of observational eyeballing drawing exercises are executed varying materials contemplating brush to pastels, from one exercise to another and although support is always paper, its size also varies constantly during a single class. At least two types of drawing are executed in each class. All these constant changes have the purpose of avoiding the focus on techniques and keeping the students focus on the drawing attitude, forcing cognitive processes underlying drawing skill to develop in order to extend the students

mental visualizing skills, not the graphic ones.

The third and last program phase of Drawing 1 continues these practices and complexifies them by using live models instead of objects and urban spaces instead of interiors or courtyards. At this point students are expected to master graphical and visual cognitive processes at a level that their graphic expression – a poiesis – emerges on their work. Final evaluation depends 75% on this phase work.

The results of this approach to teaching drawing are not only the ease, effectiveness and quickness these architects show in communicating ideas though drawing at any time and using no matter what instrument. The most relevant result is the strong visual intelligence they develop that is crucial in solving creatively complex problems and the high adaptability to any kind of working context, specially the digital one once the operator intelligence should drive the process and not the opposite. The high level FAUP students achieve is well illustrated by the high quality architecture work FAUP alumni achieve. Siza Vieira and Souto Moura are among those who saw their work recognized internationally as pritzker awarded architects. Also the increasing attention the school is getting from international students that arrive to FAUP every year keen to attend the drawing classes is significant as well as the fact that FAUP pedagogy is drawing attention from European researchers that are trying to understand how and why it works, as well as what can be learned from these methods that can be useful in other pedagogical contexts.

#### ***Research questions***

It is quite obvious that there is at FAUP a refusal to cope with the so called Bauhaus model. FAUP didn’t embrace the suspicious universal creativity myth, as De Duve has called it, which lies in the heart of the modern teaching paradigm, nor did it embrace a medium questioning or even the language framing, all foundational ideas of the modern paradigm. Instead, FAUP believes in talent and skill, just like the academies did. Nonetheless, it’s not defensible to say it continues or revives academic practices, once it also ruptures with them. However, it’s fair to say there is a rehabilitation of craftsmanship value at FAUP, but craftsmanship or talent were not key concepts in the academic teaching; they were simply the result of the pre-mechanic technology, the only one disposable at that historical period.

One can find two foundational characteristics in the academic model. The first is the preservation of a long classical tradition of canonic beauty that students had to submit to at all cost, to take it further, if

they had the genius to do so. The second characteristic is what De Duve calls the *métier*, referring to the concrete technique which had to be mastered as opposed to medium that, in the modern model, is an abstract entity that has to be questioned and communicated (De Duve 1994: 19-31). Those are also the two main reasons for the decay of academies when they faced the drastic changes happened in the productive social and economical processes of the 19th Century mechanization. FAUP pedagogical methods clearly don't share anything with one or another of those two core characteristics of academic teaching. On one hand, no models are presented to students at FAUP unless their own drawings. On other hand, the drawing program organizes itself based on perceptual cognitive challenges, not on techniques. Technique is reduced to grab any instrument that leaves marks on paper and doing so noticing that different instruments make different traces or patches.

This last issue is quite important, once one of the main problems art schools faced since de decay of academicism is the irresolvable equation of notions of technique and medium, once one constructs representations, and the other destroys them. A paradox many art schools still live in, that become aggravated when the medium concept evolved to “deconstructive practices”, in the late seventies and eighties, and students were asked to deconstruct what they had no idea how was constructed, as De Duve points out (De Duve 1994: 19-31). At FAUP drawing has become a transcendental entity, disconnected to this or that technique. Drawing is what the visual mind produces when we apprehend the world. In Carneiro words (“The real is not representable. We represent the ideas we have about the world”): e.g. (Carneiro 1994:73).

Connections between the representation goal - not the academic imitation – and the cognitive performances to create meaning – not the gestalt formalist modern rules – is the main issue FAUP pedagogy offers to discussion in the context of an over digitalized universe formatted by the limitations of artificial intelligence. However, this virtual world has brought out a relevant issue, as the pioneer in the field of virtual reality Jaron Lanier pointed out (Lanier 2010). It's the possibility of dazzle again with our direct contact with whatever is outside our bodies and become fascinated with the sophistication of our analogical minds. A back to basics attitude might save a rich culture of being a poorer one in the future as it insists in neglecting human visual intelligence.

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# Price | Gesture, affect and the pursuit of the authentic.

## Abstract

The paper offers a description and defence of the use of spontaneous gesture drawing as preliminary data for initiating a participant-observation ethnographic project investigating a community dance practice known as *5Rhythms* (Roth, 2009). It builds on the opening provided by Ingold (2011) and Pink (2009) for an inclusive approach to data that embraces sensory data and its visual expression. This auto-ethnographic phase explores intrapersonal experience and the concept of authenticity across art, dance, and therapeutic contexts. Combined danced and drawn experiences, with associated literature provide a lens for unravelling the shifts traversed by the researcher. Central to the field-practice is the use of calligraphic line that shares the ability to express shifts in dynamic and affect found subjectively in improvised dance. It is argued that the common ground of the *kinaesthetic* (Sheets-Johnstone, 2012) provides further foundation for this trans-disciplinary study. The process allowed the researcher to identify a key attitudinal shift in his own dance practice, from seeking cathartic release to an intrapersonal shift in meditative awareness of the quality of movement. Neither approach is claimed as a definitive way to interpret the dance practice. The experience of interrogating through drawing has opened the researcher to a more grounded receptive view of other participant experiences for future ethnographic research in this area.

## Biographical details

Graham Price is senior lecturer in art education at the University of Waikato, New Zealand. His undergraduate study of anthropology and art education experience led to a M.Ed thesis focusing on children's responses to adult artists' work and a review of the discourses underpinning elementary art education practice. Further post-graduate research interests have spanned investigations into the pedagogies of art and art history in elementary and junior high schools across bicultural settings in New Zealand. Recent team research has explored the interrelationships between art, drama, dance and music education and the wider curriculum amongst elementary teachers. The development of 'visual

methods' and 'role' to elicit research data for educational research with children has been a particular recent interest (Whyte et al, 2013). He has on-going research collaborations with Prof Albano at the University of Campinas, Sao Paulo, Brasil. His own artistic explorations follow a life-long interest in a cappella music, sacred dance and forms of Buddhist calligraphy reinterpreted from jewellery to sculptural scale. This particular research project brings some of those threads together in the context of community dance practices.

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## Introduction

This paper offers reflections on the use of drawing as data for interrogating researcher assumptions in the early stages of an ethnographic project into a facilitated community dance practice. This dance-based healing practice known as *5Rhythms* (Roth, 1997) attracts a diverse range from adult community members wishing to explore a facilitated experience in dance as a healing modality. Fundamental to *5Rhythms*, as with other expressive arts practices, is the relationship between authentic movement, does this feel 'true'? and a sense of well-being, do I feel whole? Central to this is the participant's development of ongoing self-awareness within the process of moving and being moved.

To know what dancing is or feels like requires both the subjective experience of dance and a means of translating that experience into shared meaning., Andrea Juhan, an experienced facilitator of *5Rhythms* dance, when writing her doctoral thesis articulates the challenge for apt description of the experiences inside this practice.

"What words can describe the texture of this kind of sensing and knowing?... It has been a tremendous struggle for me to find language that I can live with for these processes – language that comes close enough, that can do justice to the experience and does not devalue, lessen, or – worse- kill the experience." (Juhan, 2003, p. 238)

I entered this *5Rhythms* community to examine how dance experiences might be articulated choosing an initial visual art strategy of spontaneous gesture drawing as a prelude to my further research with fellow participants. The use of drawing pre-emptively delays the challenge of recording and translating a non-verbal dance experience into text. This required a theoretical lens that acknowledges the complexity of the variables at stake. The experiencing of a grounded cognition has been positioned as co-emergent with the inter-relationship of perceptions, movement (both kinaesthetic and proprioception), and the introspec-

tion of bodily states and feelings, interacting with goals and the wider environment (Barsalou, 2008; Kantrowitz, 2012). I argue that this complex interrelationship can be held and viewed heuristically within the practice of gesture drawing. Such drawings can be considered as a non-verbal field-text described by Clandinin and Connelly (2000). They concur that field texts "help fill in the richness, nuance, and complexity of the landscape, returning the reflecting researcher to a richer, more complex, and puzzling landscape than memory alone is likely to construct" (p. 83). To frame the understanding of the reader I offer a verbal description of the *5Rhythms* dance practice before moving on to the genesis of the drawings themselves and the manner in which they have been read by the author.

## The *5Rhythms* dance experience

*5Rhythms* is a dance practice in which improvised dance is explored as a healing practice that stands outside the therapeutic mainstream. The practice is led according to principles and structures developed by Gabrielle Roth while working in Esalen, USA. Through Gestalt psychology and the human potential movement she came to relate to her dance practice as having links with transformative shamanism and resisted a directly psychotherapeutic lens (Juhan, 2003). In a typical 90-minute session named 'Sweat your prayers' the music is eclectically selected across genres and cultures and dancers engage in spontaneous movement responses throughout. Dr Geordie Jahner, the *5Rhythms* facilitator in this project, carefully compiles tracks in advance and may adjust the timing and sequence nuanced by observations of the group's emergent energy. A structure of changing tempo, mood and dynamic referred to as a 'wave' consistently provides a cycle of five contrasting rhythms; flowing, staccato, chaos, lyrical, and stillness. Participants are encouraged to maintain a non-verbal presence throughout continuous improvised movement exploration. "Feelings, thoughts, ideas, memories, emotions, sensations are accessed that are not as readily available when processed on a purely cognitive or verbal level." (Jahner, 2001, p.92)

In the group setting, there is this learned agenda of acceptance of one's own spontaneous movement authentic to whatever is arising in the body, in response to the music, space and other dancers as interdependent phenomena. A vignette of a sustained 90 minutes of dancing "sweat your prayers" practice might appear as in the following representation through a storied research text.

I enter the space of the dance floor. The ambient music is slow and without accent. Fellow dancers nod a greeting or move slowly through



their personal repertoire of stretching and slow twists at floor level. Geordie acknowledges each arrival. I sink into the floor allowing the slow pull of gravity to soften me and feel a smile of welcome to this moment. Geordie reminds us to explore gentle breathing here as we find our ‘waking’ dance. We move into the wave of 5Rhythms. The music shifts into a slow pulse and a grounded slow spiral of unbroken movement unfolds the first rhythm of *flow*. Dancers gradually rise to weave the room, circling between and around each other, inhabiting their own nourishing repertoire of free-form spiralling gestures encouraged by the music, Geordie’s occasional prompts, each others’ movement and the increasing absorption in the focus on the movement itself. Words slip away from centre stage.

The music picks up pace and shifts to an accentuated beat. The rhythm of *staccato* brings sharp focus, decisive intent, directionality, edges and energised clear dynamic forms. The room feels charged, crystalline, and edgy. Pathways intersect and transverse each other with precise and sure adjustment.

The transition into the rhythm of *chaos* is marked and supported by a driving unsettling rhythmic pulse. The ‘*tribe*’ sinks into the push and pull of opposing left and right impulses, occasionally returning to a comforting sway and rock as if balancing on uncertain ground. Yielding to rising tempo, volume and discordance leaves no place for thought or contrivance. Introspective, moving with ‘not-knowing’, experiencing unpredictable disruption, trusting the out breath and body to find some sense of re-calibration, loosing what is no longer needed into the chaos of not knowing. Energy and affect swell and release like breaking waves surprising me into new territory... .

The rhythm of *lyrical* after the storm of chaos, uplifts into a lighter mood, a gentler dynamic and upbeat but more regular tempo. There is opportunity for continued release of remnant themes stirred up by chaos but with a lighter touch. Celebratory, playful sharing emerges through reconnection to other dancers in the space, moving now perhaps with a more spacious joy ... .

The music slows towards the rhythm of *stillness*; an atmosphere of introspective awareness sharpens into finely observed minutiae of mindful, slow Tai-Chi-like gestures matched by slow even breath. Dancers find their own way to sink into a body mudra that completes their journey. A final form emerges and is sustained for whatever it has to teach me.

After a reflective silence the dancers are invited to gather, link hands, seated in a circle. They acknowledge each other silently in their open uncontrived state. No shared reflection, no analysis, simply being together. A closing dedication is read and the group disperses from the space in silence. The ritual dance is completed and the space opened to the possibility of finding ways to integrate this practice into everyday day life commences. (Price, 2011 field notes)

As an epilogue, I offer the drive home from a particularly resonant 5Rhythms practice. I listened to an interview on National Radio (12 July 2011). Sister Aimee is a 92yr old Sister of Compassion nun, living

inside a New Zealand contemplative open community at Jerusalem, Whanganui. When asked what guides her daily actions, she responded, “I engage with the reality of the moment and do it lovingly”. Ah, so that’s how to lift the practice of compassionate awareness off the dance floor and into daily life!

#### *Defining the authentic*

Central to both dance and drawing practice are notions of authenticity. This slippery term has been variously used in arts literature. In visual arts it is often used as indicator of an artwork’s provenance or verifiable origins. The verifiable authorial notion of authenticity is less relevant to this study. From the perspective of the art maker authentic mark-making is a relative judgement on the resonance of the artwork in regard to authorial intention and the qualities of the medium. The drawing’s authorship is not in question. The quality of the authorial gesture is closely examined.

In dance ‘authentic movement’ often refers to an expressive dance improvisational practice developed in the 1950s by Mary Whitehouse linked to Jungian psychotherapy. To know oneself and act accordingly is seen as central to mental health. Vannini (2009) recognises personal authenticity as a socially constructed set of practices and suggests it can be treated phenomenologically “as an affective, cognitive, narrative and self-reflective experience (p.6). Vannini suggests that individuals motivated by the will to act authentically “translates into the quest for peak experiences, into appreciation for the value of creativity, and into the power of authenticity as a deeply meaningful aesthetic experience”(p.7). Authenticity in this context is viewed as a project of the self subject to intrapersonal and interpersonal assessment. This kind of authenticity is also a key founding concept inside various modes of psychotherapy: the work of Carl Jung, Humanist traditions (Rogers, Perls, Erikson, Maslow) and the existential tradition (Heidegger, Kierkegaard). Gendlin’s (1996) overview of somatic psychology practices suggests that the primary relationship addressed in somatic psychology is the person’s relation to and empathy with their own felt body.

Goldman (2004) offers a definition of authenticity as, “the unimpeded operation of one’s true or core self in one’s daily enterprise.” This definition resonates with Warburton (2011), who brings this focus of authenticity directly onto the dance floor.

The quintessential experience of dancing brings with it a sense of beingness in the here-and-now – a sensation through which one can perceive connectedness in movement, can locate the body on three-dimensional space, can feel togetherness in time, and can know a

oneness with a larger entity that humans often identify as transcendent religious experience. (p. 68)

#### *Drawing as an auto-ethnographic act*

I initially chose to examine my own participant observation and assumptions within the 5Rhythms community of interest by combining participant dance with self-reflective spontaneous drawing. As a visual art educator this seemed a potentially useful point of entry to examine my own connections to this dance practice. Viewed as a preliminary step informing an ethnographic enquiry this project builds on recent themes on the place of drawing in anthropology explored by Tim Ingold in (2007) *Lines: a brief history* and (2011) *Redrawing anthropology: anthropological studies of creativity and perception*. Ingold reflects that as audience we read a calligraphic mark not by interpreting its shape but by attending to the pathway of its genesis.

The calligraphic line is read by reliving the gestural moment that gave rise to it rather than by contemplating its final form and seeking to extrapolate to some concept of which it might supposed to be the expression. ... One has to enter into it and to join the process of its production. (p. 50)

Likewise Ingold characteristically attends to the nuances of not just of an audience but of the maker. While not anticipating combining such drawing and dance practices, Ingold (2011) nevertheless identifies the tipping point between the continuum experience of dance and the momentary experience of mark making.

In calligraphy as in dance, the performer concentrates all his energies and sensibilities into a sequence of highly controlled gestures... the entire body is caught up in the action.... perhaps there is a difference in that, whereas dance tends to be centrifugal, animated by an outburst of energy from an active centre in the dancer’s body, calligraphy is centripetal, as all energy is focused down through a succession of ‘checkpoints’ - shoulder, elbow, wrist, knuckles - to the ever-moving tip of the brush whose hundred hairs meet the paper. (p. 134)

In those drawings that I recognised as synchronously authentic, the transition between the authentic dance act and the authentic drawing act became as seamless as breathing. Pink (2009) echoes Ingold in her description of the ethnographer as sensory apprentice directly engaging in the activities they wish to learn about. The challenge that Pink lays down is that, “the ethnographer then has to unravel the academic implications of such learning and of the ways of knowing that she or he has experienced” (p.70). The academic precedence that informs my drawing responses follows.

*The lineage of 'gesture drawing'*

Most drawings arise as a trace of a hand movement holding a media, leaving a trace of - a gesture. The value placed on a 'gesture drawing' is the focus on the expressive quality of the mark made, rather than reference to its objective accuracy. 'Expressive quality' is an elusive holistic value system difficult to particularise. It is likely to involve the net effect of the use of: continuous/discontinuous line, weight or pressure of the lines, the 'ductus' or pathway of its genesis, the effect of crossing and layering, the compositional placement on the page, the relative alignment to the margins, the creation of open and closed spaces and figure ground relationships. All of these conditions coexist regardless of any referent that the drawing may address. My first intention was to find a way to study my own affective shifts inside the dance practice in a way that did not intrude on fellow dancers or disrupt their practice by creating a non-participant observer. This dance practice is certainly not framed as 'performance'. I negotiated with the facilitator to afford repeat opportunities to add my own variant of gesture drawing practice. These took the form of intermittent spontaneous drawings carried out while immersed in my own dance experience. These were not drawings of an 'observed' outer dance but a spontaneous abstract drawing generated 'in the moment'. Unpacking the origins of this choice revealed an eclectic range of sources spanning drawing pedagogy, surrealism, abstract expressionism, art therapy, and contemplative Buddhist calligraphy. The common strand is their advocacy for the power of spontaneous movement to produce authoritative mark making.

Kimon Nicolaidis' (1934) book, *The natural way to draw* remains a classic description of teaching methodologies for teaching drawing. He gives emphasis to the development of rapid spontaneous gesture drawings where the student feels their way empathically into the forms and dynamics of the subject that they are observing. This is done rapidly to grow the students' intuitive responsiveness and bypass formulaic rationalisations. For Nicolaidis the subject of such drawing was always the felt experience in relation to the external referent of the model. These methods were still highly valued appearing in Robert McKim's (1972) *Experiences in visual thinking anthology* with a nuance borrowed from abstract expressionism that such gestures may in and of themselves carry meaningful purpose without necessarily needing an external referent.

*Psychic automatism* became a benchmark of surrealist drawing in the early 20th century. Andre Breton, for example, placed emphasis in painting neither from memory nor observation but from a state of rev-

erie. Breton (1972) retrospectively described the induced freedom by focusing on the movement of his hand.

Not content simply to trace the shape of objects, this hand, enamoured of its own movement and of that alone, described the involuntary figures within which, as experience has shown, these shapes were destined to become re-embodied. Indeed, the essential discovery of surrealism is that, without preconceived intention, the pen that flows in order to write and the pencil that runs in order to draw *spin* an infinitely precious substance which, even if not always possessing an exchange value, none the less appears charged with all the emotional intensity stored within the poet or painter at a given moment. (1972, p. 68)

The interest in *automatism* flowed across art, literature and psychology within early 20th century circles of Miro, Freud, Jung, Joyce, Proust. From an art therapy perspective, Shaun McNiff explored this link to authenticity shared by both surrealism and art therapy. Authenticity was perceived as a determinant of quality. *Automatism* was a fundamental starting place for most art therapy practices. McNiff (1992) shared the customary invitational phrases commonly used by art therapists and artists alike. "Trust the process. Relax and follow its lead. Let it speak through you. Don't try to control it. Open to that which appears from outside your frame of reference" (p. 48). This trust in the unknown is common to both *automatism* in drawing and improvisation in dance.

The stream of *automatism* in Modernist practice that has been casually described as 'calligraphic' also finds a home in the abstract expressionist work by Cy Twombly and is doubly echoed in the Zen-inspired practice of contemporary artist Max Gimblett. The origins of meditative calligraphy, as a formal practice, stem from 8th Century China to 19th Century Japan. Calligraphy was revered as a practice that says as much about the state of mind of the writer as the content of the text. (Stevens, 1995). Stevens describes the Zen calligrapher abandoning himself in the calligraphy with the content coming from the within rather than from the without. Hence each work is unique, reflecting the ever-changing response of the calligrapher to the environment, the instruments of writing and the image in the mind. "The *raku-hitsu*, the instant the brush first comes into contact with the paper, reveals the state of mind of the calligrapher. It will remain weak and dispersed as long as there is something even slightly amiss in the attitude or bearing of the calligrapher" (Stevens, 1995, p.188). There is a complex nuanced aesthetic inside a Zen reading of this form of calligraphy that is produced from a state of one-pointed-mind. Among other qualities, a viewer may observe the quality of the mark made by a single brush stroke. Particular attention is paid to the strong point of entry and exit of the brush. Tentative mark making is characterised as 'weak' or dispersed as in Stevens description. Across this broad and brief his-

tory the shared Latin root meaning (L. *auctor* 'originator,') of author, authentic and authority is further revealed and attests to the centrality of the concept of 'authenticity'

*Drawing~dance as a procedure*

The intent was to form a non-verbal field text (Clandinin, 2006) to examine my own experience within the 5Rhythms dance. This investigation of intrapersonal experience in a group setting exploring spontaneous dance was to be accompanied by spontaneous drawings. Drawings were made publicly in a break away from conventional solo studio practice. At the same time I needed to signal to other dance participants that they were not the observed subject of my drawings. Drawings were rapidly generated on a horizontal surface while facing away from the dance participants to reinforce non-verbally that observation 'of them' was not part of my intention. I stocked an existing small fitted bench space at the margin of the room with A3 paper. Short widths of square black and sanguine conte chalk pastels were deliberately chosen for their responsiveness to pressure and the medium's ability to produce a variety of line width characteristic of an expressive calligraphic mark. This choice of media was not a random aesthetic preference. Conte is a dry medium, supremely responsive to pressure, without the risk of introducing ink to the dance floor. The '*taille*' mark that conte produces when used in this manner was present within 14th century Western engraving. The established power of a tapering and swelling line was also already present in hand-written calligraphy, economically producing great subtlety of rhythm, texture, and form. It is from that handwritten association that such lines are often referred to as calligraphic even though text may not be used. The association of such marks towards text-based glyphs, or a signature flourish perhaps alludes to an expectation of meaning that is not actually present. It can *suggest* the capacity for language without actually being so.

While dancing within the group, whenever I found myself near the art space (at 15 - 20 minute intervals), I would generate in 3-5 seconds, an abstract gesture drawing. Each drawing was then flipped face down, preparing a clear space for the next drawing to avoid reinforcing any impulse towards an unintended sequential narrative. Variations in the chosen format were explored for some dance episodes: portrait, landscape, and folded strips. Drawings from each dance episode were stored chronologically for later photographing, analysis, reflection and further triangulated responses elicited from a range of focus groups.

An unedited complete sequence of field-text drawings from the first dance episode follows. Even though not consciously sought, some draw-

ing sequences with a specific dance do suggest shape resonances from one rhythm to the next, even though drawings were about 20 minutes apart.

The spontaneous abstract drawings deliberately eschewed a figurative impulse, as the intent was to draw internal experience, not an observed record of form. However, occasionally, Figurative associations surfaced as in the *chaos* drawing above. Although I was expecting an abstract gesture there were some further drawings that occasionally suggested Figures. I came to accept that a drawing might carry both an abstract and a Figurative cast without the need for any censoring impulse on my part. More important was an open receptive response to the spontaneous outcome.

#### *Towards an analysis*

Drawings were photographed and stored chronologically so each dance experience had its own sequential thin section' of the dance experience.

The drawings produced (140 drawings over 7 months) were grouped and coded:

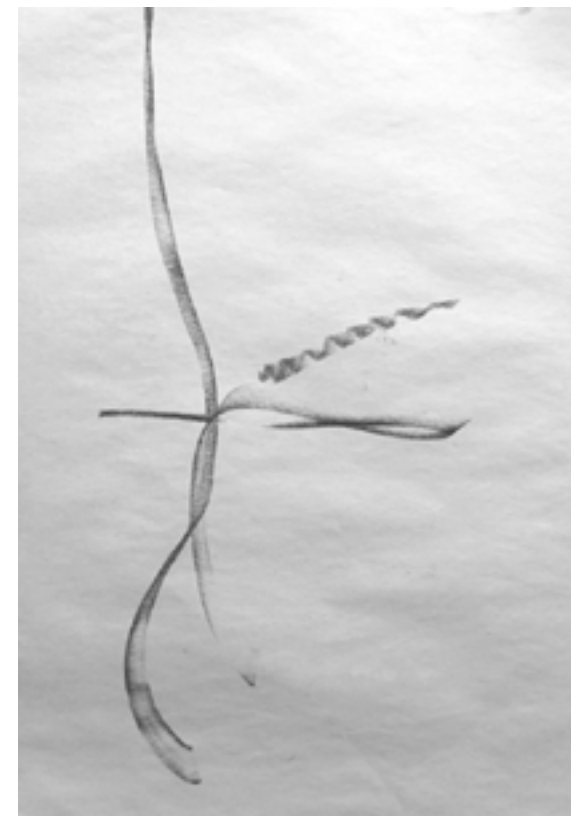
*From Left to Right: Fig 1 – flow, Fig. 2 – staccato, Fig. 3 – chaos, Fig. 4 – lyrical, Fig. 5 – stillness*

- 1) compared as a sequence of thin 'slices' of each 5 rhythms whole dance experience
- 2) interrogated as an authentically 'spontaneous' or 'contrived' response to affect
- 3) clustered as a rhythm across time, potentially representing the affective and physical characteristics of a particular rhythm
- 4) examined for the impact of paper format on the marks produced
- 5) re-examined for an evocation of danced affective experience
- 6) informally shared with dance and non-dance audiences both singly and within sequences

I examined the process of generating the drawings for any inherent challenges to their effective spontaneity. For example, there was a possibility that a shift in focus from the flow experience within the dance practice (Csikszentmihalyi, 1996) would interrupt a possible flow experience in the drawing. Mitigating this possibility is that both actions were calling on spontaneous, uncensored movement. One could think of the drawings as the trace of a committed dancing hand. Neither

the improvised dancing nor the improvised drawing 'technique' was unfamiliar which also supported unbroken engagement. However, I still needed to manage the combination and timing of these two modalities and examine this shift for any tensions working against authentic actions. A few considerations emerged. One can't be spontaneously absorbed in dance while self-consciously feeling the need to travel to a particular destination. Further tensions emerged in negotiating the drawing process that resulted in various drawings being grouped as revealing aspects of problems emerging in the methodology. There were sufficient drawings gathered that reflected both an authentic dance moment coupled with a spontaneous authentic drawing. These clarifications arose as a first order sort of the drawings to see what possibilities and constraints they revealed.

Drawings were preliminary coded as being contrived in some predetermined manner or authentically spontaneous. The drawings were powerful enough mnemonic after the dance to be initially coded on my personal sense of congruence or discontinuity with the dance experience by a simple + / -. This simple binary became more complex as I explored the variety of reasons as to why a drawing *felt* inauthentic. Drawings that felt at the time to be particularly resonant with an absorbed strong affect in the dance experience were identified. As later



and wider samples began to be gathered other categories emerged. Because the drawing was intended to follow the dance rather than lead it, no drawings were made during moments of disengaged dancing. This proved to be an interesting omission as an engaged drawing of a half-hearted dance would in hindsight have been an interesting benchmark.. My point was not to gain universal assent to my categories by an external audience. My act of producing and preliminary sorting of the drawings was to see if the drawings inhibited or deepened my absorption in the dance practice. Could I notice, in the first instance, the degree to which spontaneity had been embraced in the drawing? My unequivocal answer was yes. A confusion or disconnectedness in the drawing is immediately recognisable as an incoherence, hesitation or awkwardness in the observed line. An informed viewing audience, used to reading drawings, may also recognise such qualities within the drawing. To the same degree I'm sure a trained dance observer would instantly recognise disengaged dance moves that represented rehearsed or stuck patterns of movement in an improvisation class.

The table below summarises the broad criteria arranged in a hierarchy of absorption and spontaneity. I offer sample scripted mental verbalisations within table 1 and extrapolated in the following paragraph.

*No drawing:* I wished to avoid the drawing practice taking precedence over the dance experience. There were times where the dance practice was so absorbing or spatially situated that I simply ignored the 'need' to draw. This was most likely to occur at specific phases within the 5Rhythms dance. *Stillness*, as a rhythm, becomes highly introspective and the least concerned with directional travel. *Chaos* as an energetic dance rhythm can travel, but by nature is directionally unpredictable. It was pure chance in both cases that I might be able to spontaneously shift to a drawn response without being driven by an intention to do so. Consequently drawings of these two rhythms were the least represented in the overall sample.

*Contrived drawing response to authentic dance awareness:*

It was possible to be fully engaged in the dance experience then notice myself distracted by mental conversations antecedent to, or during, the drawing. Clearly this was where spontaneity became sacrificed to an intention. I became very interested in noting where such distraction occurred as they often caused confusion or observable awkwardness in the drawing itself. A memorable moment was floundering with my first drawn response to the experience inside *stillness* as a rhythm. I recall

Drawing / Dance	Disengaged movement	Dance driven by musical impulse alone	Absorbed spontaneity in dance	Absorbed dance spontaneity with high affect.
No drawing made	-	-	-	* Few drawings of <i>Chaos</i> or <i>Stillness</i>
Contrived drawing Subvocalised thought	-	"try not just to copy the beat... be the dance experience"	"This is cool lets get to the drawing station"	<i>stillness</i> drawn intellectually rather than spontaneously. Anxiety of getting the drawing 'right'. "Stillness must be round!"
Drawing driven by musical impulse alone	-	Drawing accurate for danced experience but neither form going beyond holding a strong beat	Drawing matches a musical accent but is disjunct with the level of absorption in the dance experience	No sample
Absorbed spontaneous drawing	-	Drawing accurate for danced experience but expressive of more than just a strong beat.	<ul style="list-style-type: none"> <li>• authentic dance</li> <li>• authentic drawing</li> </ul>	<ul style="list-style-type: none"> <li>• authentic dance</li> <li>• authentic drawing</li> </ul>
Absorbed spontaneous drawing carrying high affect of dance experience	-	-	-	<ul style="list-style-type: none"> <li>• ++ authentic dance</li> <li>• ++ authentic drawing</li> </ul>

Table 1. Heuristic of degrees of absorption in the task across both fields of drawing and dance

mentally rehearsing in that moment “stillness is surely expressed in roundness”! Sure enough I drew a tentative closed circle but clearly I lost whatever spontaneity might have been present. As I let go of such preconceptions, later opportunities for authentic drawings of stillness took on their own collective character. They mostly exhibit a light touch and an open central column with various alignments.

*Occasionally the pedagogue within me would wish to prompt:*

“Mmm very subtle dance movement - must use tentative conte gesture”. Such distractions are ultimately recognisable in the drawing itself as moments of hesitation or awkwardness in the flow or dynamic of the drawn line and are shared below.

*Contrived drawing driven by the music.*

Strong musical beat consistently produced accented gestures in both my dance and drawing. Occasionally my drawings merely expressed this rhythmic pulse, much like a graphic score. My response to such drawings remains neutral. The drawings appeared uninformed by any particular subjective quality of my dance experience. One could argue that the drawing is accurately recording my experience. I simply was engaged in a repetitive rhythmic impulse devoid of affect. Either way, these kinds of drawings retained a sense of contrivance in the drawing, dance or perhaps both?

*Authentic drawn response to a contrived dance movement*

When the “need to draw” arose as a self-conscious intent this sometimes changed the authenticity of the actual dance experience. The ‘imperative’ to travel towards the drawing station introduced directional travel when this may not have been inherently present in the movement. Drawings produced under these conditions accurately manifest awkwardness and some internal confusion.

*Feeling of easeful seamless transition in and out of the drawing experience.*

This category corresponds to a synchronous authentic drawing matching authentic dance immersed experience. Under such conditions the image resonates with both movement quality and affect. In general it was found that the act of drawing itself could serve as a diagnostic reminder of my state of absorption and thus became a useful feedback system into maintaining a more continuum state of presence. With repeated opportunity this category of drawing became more common. *Powerful affect arising within the dance experience concurrent with*

*powerful authentic drawing.*

As within Zen calligraphy such uncontrived spontaneous drawings had an element of surprise and an intensifying of cathartic release that was carried seamlessly back into the dance.

Drawings were also grouped under the rhythm that they were produced in and scanned for resemblances or recurrent motif. A similar grouping exercise was carried out with the raw data by various interest groups. Samples from multiple dance episodes clustered by their actual place within each rhythm are represented below. The first image within each trio of drawings is an example of a “contrived” image, where mental activity, disrupted the intended spontaneous production. The second and third drawings may show more fluid responses and potentially indicate common qualities derived from related rhythms. Colour shifts represent an intuitive choice between sanguine and black made at the time. There were times where the absolute strong contrast of black/white was sought and others where the warmth and dynamism of dull-red sanguine chalk seemed called for.

*Flow:*

An initial contrived response due to mental activity and disconnected-



Fig. 6 – contrived flow, Fig. 7 – flow, Fig. 8 – flow

ness shows awkwardness in the rhythm and indecisive random marks lacking connection. The characteristics of successful flow drawings trend literally towards interwoven rhythmic lyrical gestures. The calligraphic use of a mobile wedge of conte easefully represented movement in this rhythm.

*Staccato:*

(Figures 9, 10 & 11 overleaf)

There is a defining directional imperative inherent in the staccato rhythm that is easefully reflected by strong directional mark making. The first drawing in these three is placed as somewhat lacking reference to an authentic dance moment as it was produced in a very stationary aligned manner even though the driving musical rhythm is spontaneously evident. It lacks the fluid sense of movement pathway implied by the latter two drawings.

*Chaos:*

(Figures 12, 13 & 14 overleaf)

Chaos as a contrived drawing on the left shows a strong angular musical-score-like sequence of changing marks. The more spontaneous



*Fig. 9 – contrived staccato, Fig. 10 – staccato, Fig. 11 – staccato*

*Fig. 12 – contrived chaos, Fig. 13 – chaos, Fig. 14 – chaos*





drawings reflect the left-right asymmetries of the dance rhythm, simultaneous opposing impulses and exhibit a more dynamic composition on the page. Chaos was consistently the rhythm that deviated from a trend in mark making genesis that in general reads from left-to-right, top-to-base.

*Lyrical:*

Top from Left: Fig. 15 – contrived lyrical, Fig. 16 – lyrical, fig. 17 – lyrical

The lyrical rhythm was the most challenging rhythm to satisfyingly represent. I suggest this is partly because it is the rhythm I am repeatedly challenged by. Clearly the first drawing self-consciously symbolically rather than spontaneously records residual sadness stirred by chaos and a tentative representation of gentler background movement. At their most authentic the lyrical suite of drawings commonly share a sense of uplift, open structure and a rapid flicker that is integrated into a continuous movement. This momentary flicker interests me as a motif. Gabrielle Roth (1997) describes the light and playful energies of lyrical like changing channels ‘faster than any remote... In lyrical, we realise that we have the freedom to keep shifting energies so as never to get stuck in any one possibility and to know that all possibilities are available to us at all times.’ (p. 162)

*Stillness:*

Bottom from Left: Fig. 18 – contrived stillness, Fig. 19– stillness, Fig. 20 – stillness

I harboured a formulaic expectation of stillness being represented by a circular motif. The slow rhythm of stillness allows plenty of time for



drifting in and out of thought unless the dancer remains very attentive to micro-movement. Only when I was dancing this rhythm near the drawing station was a drawn response even possible. Even one intentional step towards risked a break with the minutiae awareness of the flow of movement. The stillness drawings deemed authentic usually show an open central axis, slightly inclined with a lifted focal point often beyond and above the page. So much for a presumption of inward closure! I take heart in being surprised by such findings and taken into new territory.

*Sharing the drawings with the participant group*

Clearly 5Rhythms practitioners are insiders to the backstory of the dance practice. Sharing my results with them was an exercise in mutual trust building. I had been in ‘their’ space producing drawings and there was natural curiosity about that. I also had the next phase of the project in mind, seeking willing informants to interview their own responses to their 5Rhythms dance experiences. That this group also affirmed the aptness of the marks in representing my felt dance was a validation. Some responded to particular drawings in spontaneous movement with their own bodies, as an interpretive act. For many it was not until the drawings were shown in an animated sequence that the dance referencing felt complete. For me, the most evocative drawings had the capacity to re-invoke the affective quality of the dance beyond time, acting more like a mnemonic trigger back into the quality of the experience. This was consistently true where absorption in both the

dance and drawing were matched in their resonance to a strong affect. Such drawings in the dance contributed to a deepening shift in intensity. This non-verbal re-presentation of a kinaesthetic experience takes us to the heart of some established artistic genres and deserves further theoretical reflection and contextualisation. As an advocate for ‘sensory ethnography’ Sarah Pink’s 2009 edited book is curiously quiet on the possibilities for the kinaesthetic except in the sense of a pathway in her scenarios of walking with video. As for much of the literature on the senses, the fundamental input of the sense of movement is so pervasive that it receives little comment. The following section mines utterance and theorising around the kinaesthetic.

*investigating the experience of improvised dance*

Central to this paper is the concern to re-present my dance experience in a sympathetic manner. Reporting intrapersonal states are problematic and normally approached via interview, diaried field-notes or some variant of spoken or written text. Just how close do these utterances take the reader to the experience?

Accounts from professional dancers of their subjective improvisation dance experiences are reported dialogues in a collection edited by Benoit-Nader (2009). They illustrate just how verbally elusive the phenomenon of improvisation is.

We often associate improvisation with “freedom of movement” which would allow us to do “whatever”. But this movement practice requires quite a rigor, a state of complete awareness and a constant presence. (p. 7)

...there’s a lot of consciousness in what you are doing?

In the moment but not after the moment... In the moment there is a lot of consciousness. (p. 51)

...do you see yourself from the inside?

From the inside I see very clearly. Witnessing my own movement, yes indeed. I see it very clearly from the inside, but I know nobody else has that view, it’s unique. I only have my own knowledge and my own inner language, which we all have. We share as much as we can, but we wonder, we always wonder (p.59)

Philosophically the links between affective states and kinaesthetic awareness have been expressed through Langer’s (1957) recognition of non-discursive art forms providing expressive form: “what is expressed cannot be grasped apart from the sensuous form that expresses it. In a work of art we have the direct presentation of a feeling, not a sign that points to it” (p. 134). It is this direct presentation of feeling that is explored both within the 5Rhythms and my drawn responses. In bypass-

ing the urge towards premature verbal signification this modest project has dropped us into the nature of affect, movement and the experience of wholeness. One could position the drawing as a translation of the dance experience, just another non-verbal sign pointing to the dance. I argue that both the dance and drawings have the potential to be “co-direct” presentations of affect and non-verbal consciousness. Both are simultaneously present in the same field of kinaesthetic experience. Maxine Sheets-Johnstone (2012) has amplified the lineage of attention to the kinaesthetic. She claims present-day cognitive science is still limited in its ability to provide insights into dance. “Being largely tethered to happenings in the brain, it lacks foundational grounding in experience, specifically, the actual experience of movement, which is to say, kinaesthesia” (p. 39). She continues to remind us that the ever-present phenomenon of movement can at any time be consciously attended to. “At any time we care to pay attention to our own movement—our own “action”—there it is. (p. 43) Going on to describe the essential characteristics of Steve Paxton’s “contact improvisation” form, she describes, “the on-the-spot, spontaneous and on-going creation of improvised forms. They are firmly rooted in the experience of self-movement, that is, in the pan-human sense modality of kinesthesia” (p. 50). This same improvisational focus is clearly present in the practice of 5Rhythms dance practice. She argues that cognition is not the ground floor of being. Below cognition animation and dynamics underscore all forms of animate life. She advocates paying close attention to the non-linguistic corporeal concepts that undergird “cognitive explorations, affective dispositions, progressively formed beliefs about the nature of the world, affective interactions with and knowledge about confrères” (p. 55). Movement is always the foundation of the living present.

Within the experience of 5Rhythms dance one reaffirms that emotion can be generated and explored through bodily movement. Both feeling and movement are dynamic in character and can be *moved through*. Sheets-Johnstone claims there is both empirical and phenomenological evidence that dynamic congruency exists between movement and emotion. In normal life such congruency goes hand in hand and is often unexamined. In a professional dancer’s life such emotional connections may be bracketed through aesthetic distancing thus the dancer is capable of presenting an ‘affectively charged’ but not necessarily ‘affectively felt’ performance. 5Rhythms dance however is neither a performance art form nor produced by professional dancers. The dancing co-participants are in a safe space, consciously embracing the felt emotional life of the body as it arises. The goal is to move through it with awareness. The challenge is to listen deeply, become more attuned to

what our bodies are saying. Bypassing the verbal allows the experience to be witnessed without judgement and perhaps let go. Witnessing, just experiencing the present without elaboration, is in itself a moment of liberation if viewed through the lens of meditative practice.

To return to *how* these drawings share in the focus of the kinaesthetic, I re-evoked Tim Ingold’s description on how to read a drawn line by reading the dynamic pathway (‘ductus’) of its genesis. Deanna Petherbridge (2008) recognizes this link between the calligraphic in both paleography, (the analysis of handwriting), and the gestural expressive work of Cy Twombly. “In paleography, handwriting is assessed not on the basis of the form of the visual product but on the basis of the path that the hand travels. It is the activity of the hand that forms the basis for the classification and definition of various letters. Indeed, it is the hand that conducts the line: from top to bottom, from left to right, by stopping, breaking off and continuing somewhere else on the paper. According to Barthes, it is the ductus that is dominant in Twombly’s work” (p. 63). As Petherbridge explains, “Drawing is an immanence, always pointing to somewhere else – to a chain of serial development, another condition, another state, even when, as a gestural flourish it appears to have said everything in the most economical manner.” (p. 37) This pointing to another state, even as a gestural flourish, is for me located most solidly in the ground of animate life – movement. This direct reference to the kinaesthetic may explain selected images resonating with wider audiences. Visual artists, professional dancers not directly familiar with 5Rhythms practice, and amateur dancers committed to this practice, offered similar selective groupings of drawings from their variously embodied responsiveness. This could also connect to contemporary cognitive science’s view of mirror neurons as a mechanism for informing empathic responsiveness (Kantrowitz, 2012). This is not to ascribe a universality of meaning to these private marks. Selected audiences all carried their own predisposition to meaning making framed within the context of sharing this work.

*Dance-drawing as meditation practice*

My focus in the project evolved into how the transition between drawing and dancing was managed. This subtle shift into a witnessing focus signalled that I was now using the dialogue between my dance and my drawing to explore a deeper layer of being. My dance had now become more an exercise in consciousness and the ability to sustain a quality of awareness with any shift in circumstances. My internal locus had moved from a danced cathartic expression of impulse, into witnessing the impulses as they manifested. This state of witnessing was also capa-



ble noticing nuance within a spontaneous drawing process. Perhaps I was initially professionally more attuned to the feeling of an inattentive drawing than aware of my inattentive dance habits. Certainly the quality of both the drawing and dance felt more synchronised once this state became more regularly entered. This felt like the most important realisation of my *dance ~ drawing* exploration. It was as though the act of drawing helped give immediate feedback into the state of ‘presence’ within the dance, without the need to enter into judgemental interior dialogues. William Thompson (1998) charmingly describes this seeking out of non-verbal consciousness as trying to get at “the ground that is underneath the filing cabinets” (p.73)

The continuity of my awareness moving into the execution of the drawing from dance, required deep scrutiny, as did my subtle re-entry into the dance. Indeed, only after many iterations of the 5Rhythms dance practice did I notice that my post-dance interest in the forms of the drawing or the forms of the dance improvisation had lessened its hold. Ingold’s contrast of calligraphy and dance as movement from the centrifugal to the centripetal evoked for me, the analogy of a centripetal in-breath followed by a centrifugal out-breath. A careful observation of the transition present at the end of an exhalation/inhalation cycle exists in the Buddhist classic meditation on breathing, *anapanasati*. (Namgyal Rinpoche, 1992) Attending to this transition in breathing meditation, brings one to an induced stillness. Building such capacity for a continuum of witnessing has been a goal in meditative practices for thousands of years. Witnessing is a preliminary disposition of detached curiosity that bears close resemblance to western concepts of aesthetic distancing. It is but a prerequisite to mindfulness and practices leading towards the experience that Buddhist literature characterises as an early stage of absorption, *Samadhi*. Although meditation technique is popularly imagined by representations of a stable-seated position and focusing on the breath, it is but one of many approaches based on awareness of the body and the refinement of the senses grounded in wholesome conduct. Here lies the continued challenge of representing the subjective non-verbal experience in a way that enlarges our understanding.

#### Conclusion

Drawing, as a valid component of field notes within an ethnographic context, has been explored and defended. The open-ended, non-verbal nature of spontaneous drawings provided a stimulus for rich reflection on intrapersonal non-verbal phenomena. I have suggested that the defence of such practices may well stem from the shared kinaesthetic

ground from which both improvised dance and drawing spring. The selection of a gesture drawing process, the media responsiveness of conte, the scale and format of paper all were matched to the intended focus of improvised dance. These media choices were built on an intuitive sense of compatibility informed by years of art practice. With other participants their range of preferred media expertise would need to inform such selection.

If I want to understand how community participants experience a dance practice, it is not enough only to focus on the role of embodiment and self reported engagement. It is equally important to uncover the context in which they create their own meanings and function within the group setting. This broader objective forms the next phase of the project. How participation in the dance practice informs, reflects and connects to daily life is also signalled for further interrogation.

To this end I am confident that the visual responses already made have the capacity to resonate with a sympathetic audience. The drawn felt experience perhaps allows an ambiguity and open-endedness that initial verbalisation may pre-empt and over define. The drawings have already demonstrated a useful starting point for conversation as an informal object-elicited interview prompt. Perhaps further combination of drawing and interview will facilitate a more open and participatory understanding of embodied thought in action in a wider range of fields.

Through this extended drawing investigation I have come to recognise that for me, 5Rhythms dance practice perhaps has much more in common with the contemplative life than the dance and therapeutic landscape from which it was derived. This opening investigation through drawing revealed my bias as a by-product of both engaged drawing and my subsequent storying of their unfolding role. The next ethnographic challenge will be to explore how participants frame themselves within their 5Rhythms practice. I’ll enter that task with much deeper awareness, a more attuned listening ear, and perhaps a still place for their own reflective drawing as both non-verbal field-text and storied research-text. Clearly the often over-looked ground of the kinaesthetic forms a rich foundation for such an investigation.

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# Samuel | Drawing as Thinking in Chaos Theory

## Abstract

One of the most popularized fields of mathematics in 20th century fell under the label ‘chaos theory.’ Though its foundations were already in place by the end of the 19th century, chaos theory became mainly associated in public with the aesthetics of early computer graphics and its seeming endlessly repetitive zooms into colorful, bulky Mandelbrot sets and glossy fractal landscapes. However, the emergence of a theory of complex dynamics in the 1970s would not have been possible without both analogue and digital computer technology as instruments of experimental visualization. Nevertheless, the pencil did not function merely as a supplementary tool of investigation but played a pivotal role in the formation of theories. It was not in spite of but rather because of the emergence of computer generated images that drawing became an indispensable tool in the process of extracting a theoretical idea from the bulk of visualized data. This specific function of drawing will be exemplified by an analysis of the working method of the late French mathematician and eminent specialist in this branch of complex dynamics, Adrien Douady. With respect to his techniques, the presentation will ask to what extent the multi-faceted mannerist term *disegno* (ital. drawing, draft, plan) could be applied tentatively to different types of mathematical computer images and their interaction with drawings made by hand.

## Biographical Details

Nina Samuel is an art and science historian and independent curator based in New York City with a PhD in Art History from Humboldt University, Berlin. Her thesis, entitled “The Shape of Chaos”, investigates visual epistemologies in the field of complex dynamics and drawing as a mode of thinking. During 2011-2012 she was Visiting Assistant Professor at the Bard Graduate Center in New York City. Scholarships and research grants include Fulbright, the NCCR Iconic Criticism: The Power and Meaning of Images (eikones), Basel, and the

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*Drawing is a discipline of vision* (Hill 1966: 25).

If one wants to pursue the investigation of the interdependency of the visible sphere and the world of mathematical ideas, it is especially fruitful to look for interactions between early computer-generated pictures and hand drawings. To identify different epistemic roles of hand drawing, this paper will have a close look at the practices of the mathematician Adrien Douady (1935-2006), a French Bourbakist and an expert in the field of complex dynamics and chaos theory.

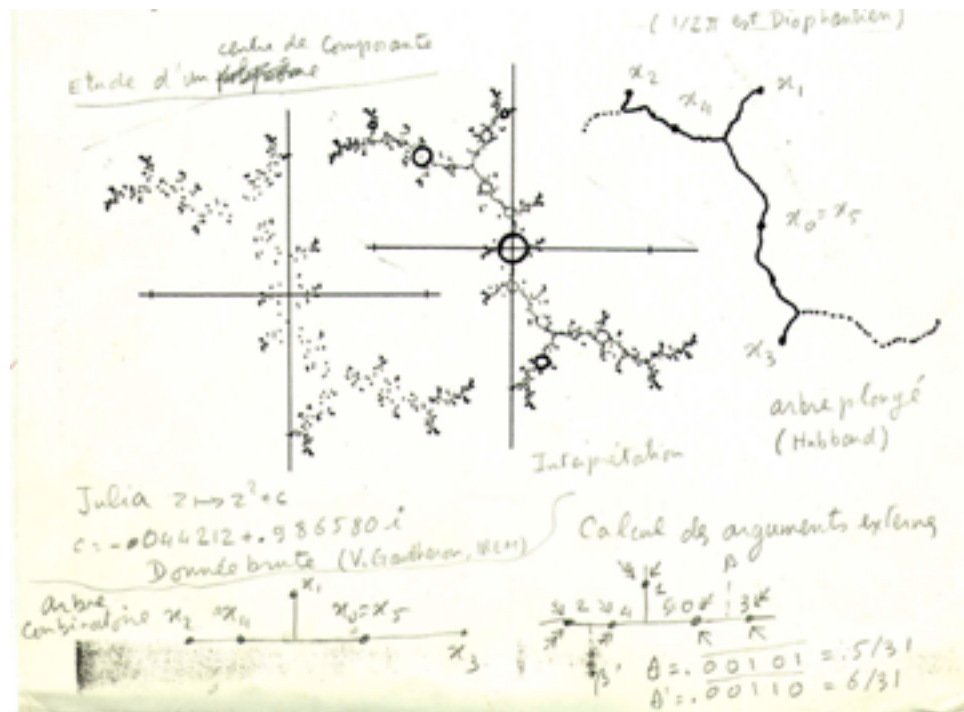
Contrary to many of his contemporaries, Douady was not of the opinion that computer graphics had “brought back the eye” into mathematics (Mandelbrot 1992: 4). However, he insisted that pictures and the eye had never wholly disappeared from mathematics insofar as geometry-oriented mathematicians had been making drawings all along. Douady reported that even when the dogma of iconoclasm was in ascendance, the visual had found secret yet effective ways into the discipline (Samuel 2005: 18-31). Mathematicians had been known to climb rooftops in

Paris to draw gigantic diagrams with crayons on walls and to make sub rosa sketches on pieces of paper under tables during lectures (Douady 2005: telephone interview). He stressed that “the eye” had only disappeared from the sphere of publications (“expression”) but never from the sphere of thinking and the creation of ideas (“conception”). As an experimental tool, the computer had revealed new structures, to be sure, figures that one would never have been able to see otherwise, but that alone had by no means facilitated a mathematical seeing: “Sur cette donnée brute, vous n’y voyez rien. (“On this donnée brute, you don’t see anything.”)” The French expression “donnée brute,” which Douady uses for digital pictures both seen on the screen and as printouts, can be translated as “raw data”; it stands for pictorial material that has yet to be processed analytically. The second meaning of the term, the “raw given,” makes it clear that here the mathematician is operating from the start not only with data but with something visually concrete.

In their basic building blocks—and because of the low resolution of computer graphics in the early 1980s—representations of Julia sets consisted of exploded black rectangles that only outlined raw shapes (fig. 1); they had yet to be made accessible for seeing, at least in the sense of mathematical comprehension. Computer-graphic representations of formulas contained a surfeit of information, which Douady translated in an epistemological three-step process from a digital to an analog



medium in order to interpret them. One of Douady’s worksheets (fig. 2) shows how he first placed the “raw,” “unpolished” rectangles derived



from a formula on the sheet for preliminary consideration (on the left), then in a second step drew connections between some of those tiny rectangles (in the middle), ignoring others or accenting them with small circles (interprétation). In a third step, seen at the far right of the picture, he reconstructed and abstracted the information it obtained in a branching line. That line, employed as a tool in the analysis of the dynamics of Julia sets, is reminiscent of a curved branch, sharply bent at the ends (arbre plongé), that would later come to be known as a *Hubbard tree*.

Douady’s drawing was an independent tool for understanding that played both a mediating and a constructive-transformative role. The mathematician first explored the computer-generated picture with his pen. Then the independent line itself, no longer embedded in the coordinate system, became a subject for mathematical investigation. In a radical reversal of the Platonic dictum that discursive thinking (δίανοια) requires no visible forms (Plato 1989: 744-47), the drawing became both a tool that helped Douady to understand the computer-supported mathematics of complex dynamics and a mathematical object to be analyzed by his διάνοια .

The three steps from donnée brute to drawing recall the function of *disegno* in early modern times, as employed, for example, by the artist, biographer, and theoretician Giorgio Vasari in the mid-sixteenth century in a preliminary drawing for his fresco *The Studio of the Painter* (fig. 3) (after 1561). There the viewer gazes into a pair of barrel-vaulted



Abb. 4: Giorgio Vasari, Vorzeichnung zum Studio des Malers, Florenz, Uffizien, nach 1561.

spaces connected by a corridor and doors. On the right, female models are assembled in front of a multi-breasted Diana Ephesia meant to embody the laws of nature. They are about to step over into the left half of the picture, where a painter is working at his easel, his gaze directed at additional posing models. The center compartment contains a niche holding a male statue, identified by its attributes and triple profile as a personification of *disegno*. Vasari here translated his theory of art, formulated in the second edition of his *Lives of the Artists* (1568), into a concrete pictorial allegory: As a draftsmanly step in the development of an idea, *disegno*, the basis and source of all arts, plays an intermediary role between nature and art (Kemp 1989: 221-34).

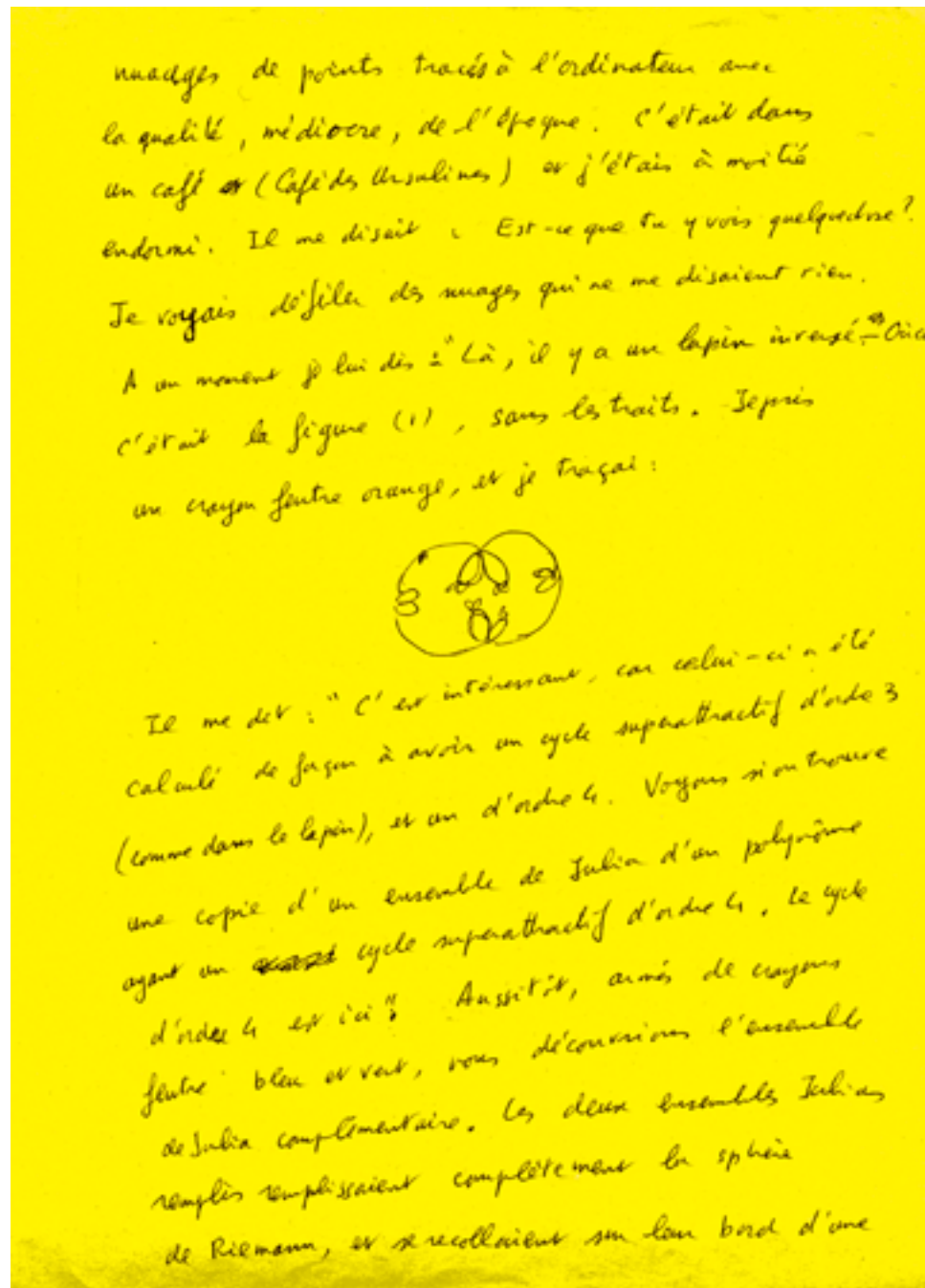
Douady’s conversion of the computer picture into a curving line translated the classic use of *disegno* into a method for generating a mathematical theory. In a “corrective overview” (Kemp 1989: 230), the mathematician extracts a mathematical concept (concetto) from the “raw given” by means of drawing. In both cases, it is only the drawing that makes possible the process of visual transformation. As opposed to Vasari’s practice, however, the end product of draftsmanly conceptualizing in mathematics is not a unique work of art or the perfect image but

rather a theoretical notion coagulated into a drawn line, a “snapshot” of knowledge, which is fed into the thinking process and used for further deliberations.

Once the telling lines had been extracted from numerical mathematics, they could function as a way of stemming the tide of serial similarities characteristic of images in this field of study. The repetition of nearly identical images can be tiring. Douady relates that he once almost fell asleep in a Paris café in 1982 when presented with a series of similar pictures composed of “computer-generated clouds of dots” (Douady 2004: letter to the author) that his mathematical colleague John Hubbard had placed before him. Fresh from the printer on so-called continuous paper perforated at the edges, they represented seemingly endless variations of Julia sets, graphic depictions of rational functions produced by a dot-matrix printer. Hubbard was unable to make out the significance of the pictures and so had confronted his colleague with a whole stack of computer graphics. Douady tells of the encounter in such a colorful way that it is worth quoting him directly: “He asked me: ‘Can you recognize anything?’ I had nearly fallen asleep, and could only see a succession of clouds that said nothing to me. Suddenly I said to him: ‘There, an upside-down rabbit!’ – ‘Where?’ – I took an orange marker and traced it in the picture” (fig. 4 overleaf). Douady had observed the succession of similarities, and it was only the recognition of a shape and his drawing that relieved him from boredom. The “rabbit” that Douady felt he could see in the clouds of dots was a playful term for a specific quadratic Julia set, the characteristics of which he had intently studied for years [fig. 5, top]. It owes its name “fractal rabbit” (*lapin fractal*) to what appear to be ears extending from either side of the globular body. In his draftsmanly retracing of the *lapin*, the scientist was treating the digital form as if it were clay or rubber: The rounded center section was taken apart and the “ears” were folded down along the inner edges and placed in perfect alignment with the sides of the printed pattern [fig. 5, bottom]. Douady had turned the computer graphics into usable material for thought. In the process of his trying to understand the data before him, the line derived from the cloud of pixels came to seem like a plastic material, pliable and ductile. While the drawing in this first example still only helped him to review the basic structure, he adapted the previous branching line of the *Hubbard tree* as if it were made of wire and could be bent at will. What was of importance mathematically was the way it converged in the center of the picture with the rabbit’s sweeping semicircular arcs and the loops surrounding the image.

Despite its humor and subjective, anecdotal character, Douady’s description of his discovery is of central importance in the history of

Fig. 4

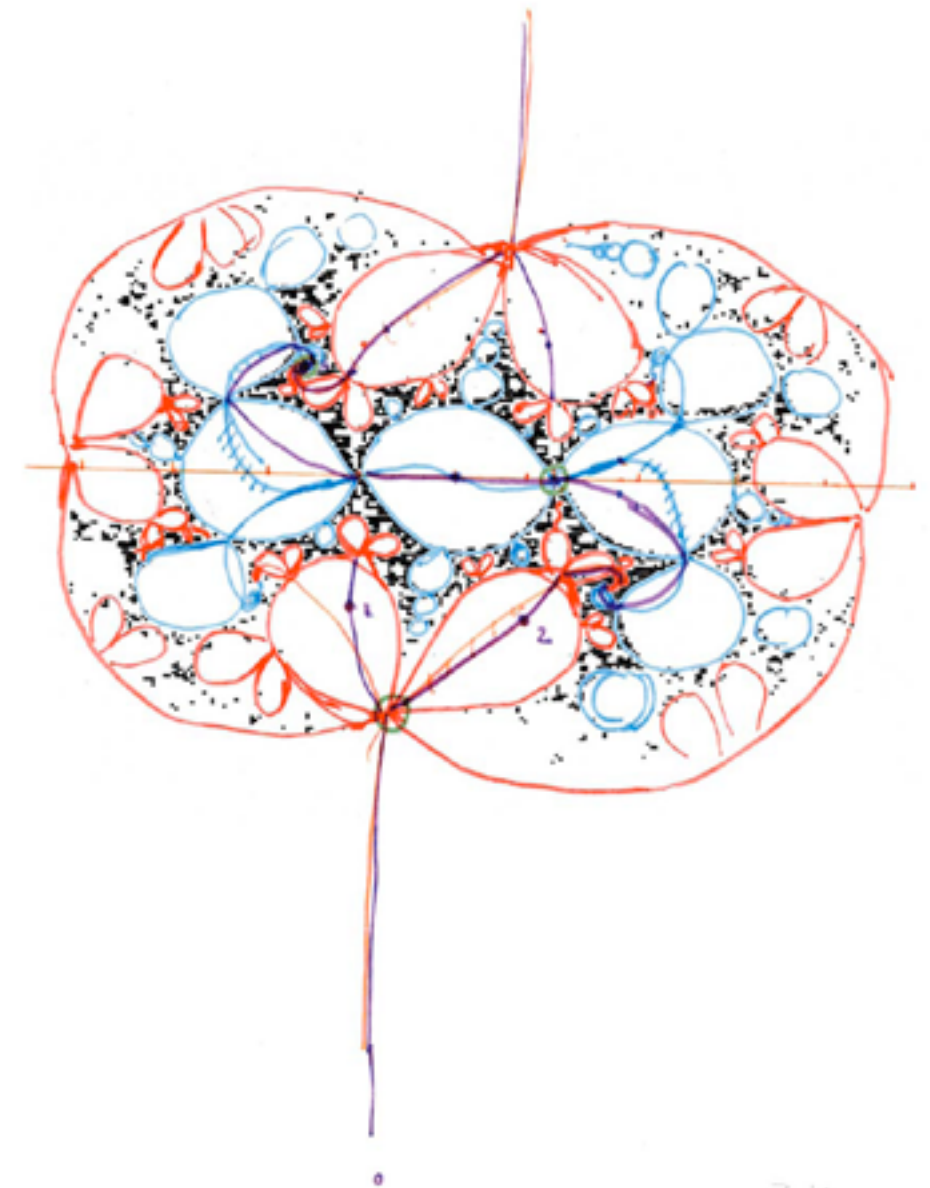
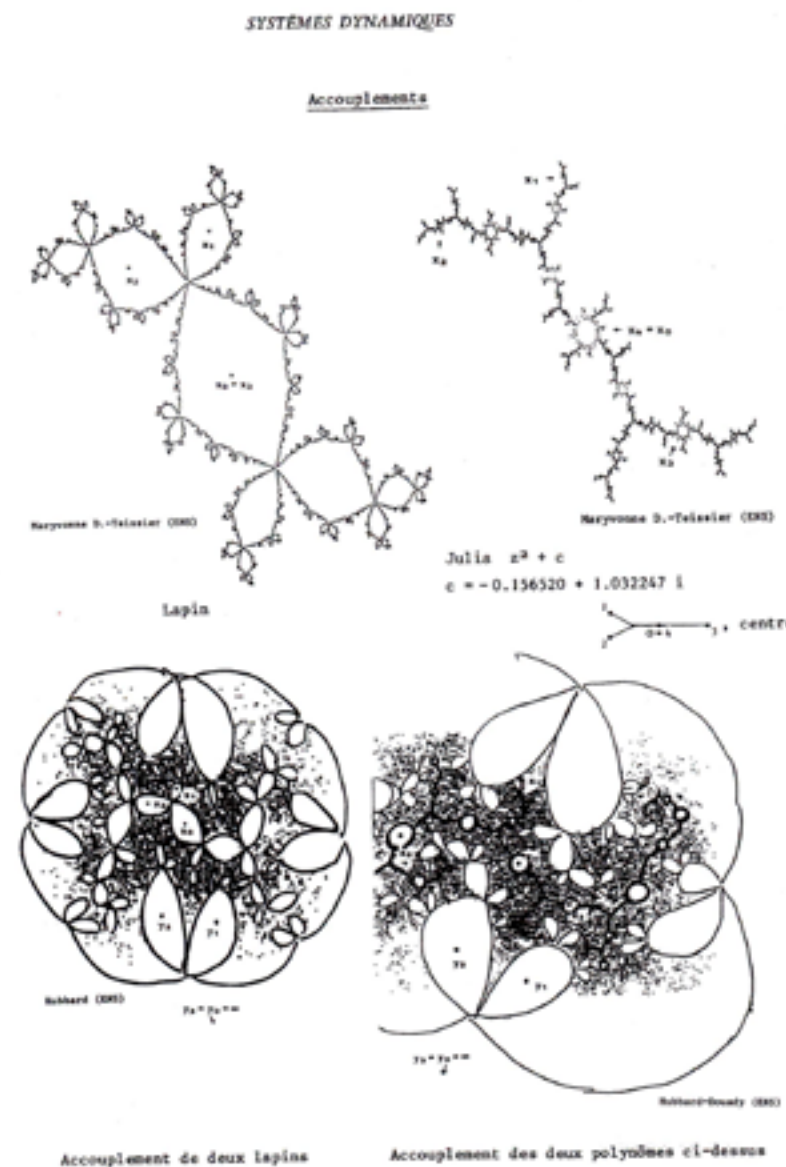


analytical way based on formulas, Douady insists that it was precisely the act of drawing that led to the mathematical insight: "And just at that moment, quite suddenly, as soon as we had made the drawing, we understood what was going on" (Douady 2005: telephone interview).

In his handwritten chronology of the events, Douady emphasized the moment of recognition with a drawing interrupting the lines of text (fig. 5). Its shape, somewhere between an oval and a heart with loops turned inward, gives the impression of an eye gazing out between the

lines. It can be regarded as a symbol for drawing as a thought process in mathematics.

A number of Douady and Hubbard's drawings for the "matings" are known. One of their preferred methods in the early 1980s was drawing on semitransparent foil. In figure 6, one can see how Douady traced different curving lines in red, blue, green, and violet. The "rabbit" is visible in red. The drawing is anchored in the transparent picture space by two slightly curving vertical lines. Vigorously curving loops and loosely distributed circles alternate with trial lines, some of which are



the representation and understanding of complex dynamics. What Douady and Hubbard first discovered together in pictures they were later able to transform into a valid mathematical proof. They gave the name "matings" ("accouplement fractal") to their theorem because the mating of two Julia sets of different classes of equations completely fills the field of complex numbers that mathematicians refer to as the Riemann sphere.<sup>139</sup> Although the proof had to be worked out in an

struck through with hatching. These are traces of mathematical exploration that constitute a virtual allegory of the process of cognition, of its tentative searching, calculating, making of mistaken assumptions, and experiencing of reversal and reinforcement. Here, only by means of drawing, mathematical reflection could be seen as both controlling the digital space and becoming independent of it: With the use of foil as a transparent picture support, the visualized theory could be literally liberated from the mass of raw data. This drawing of course was not the proof, but it did provide evidence of what could later be confirmed. This is the core notion of the second possibility presented in this essay: that it is hand drawing that enables mathematical understanding in the realm of chaos, where serial pictures form sequences of similarities.

Analog and digital techniques are by no means mutually exclusive in fractal mathematics; they require and support one another. The drawing is not replaced by computer graphics; it enhances them and makes them intelligible. In fact, it is precisely owing to computer graphics that the pencil has become the mathematician's indispensable thinking tool when extracting a theoretical concept from the mass of visual data.

Douady, a skilled draftsman, produced a large number of other versions of his *lapin* (fig. 7 below). Made up of innumerable curves, curlicues, spirals, swirls, and snaking lines, his *lapins* explore geometrical relationships that can be proved mathematically, to be sure, but cannot be calculated and depicted by any computer. The center composite

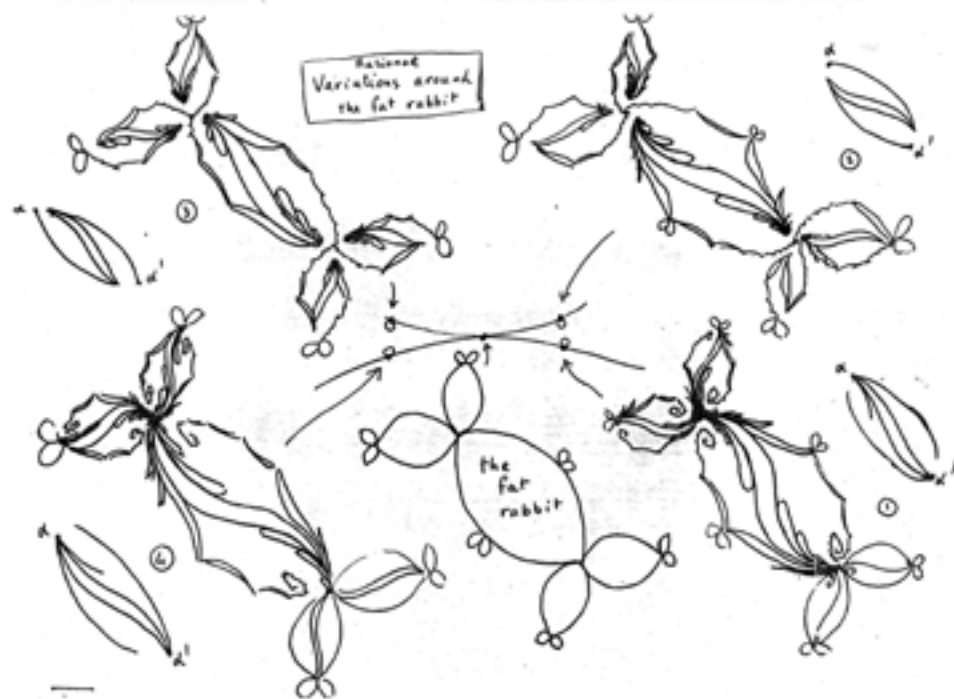


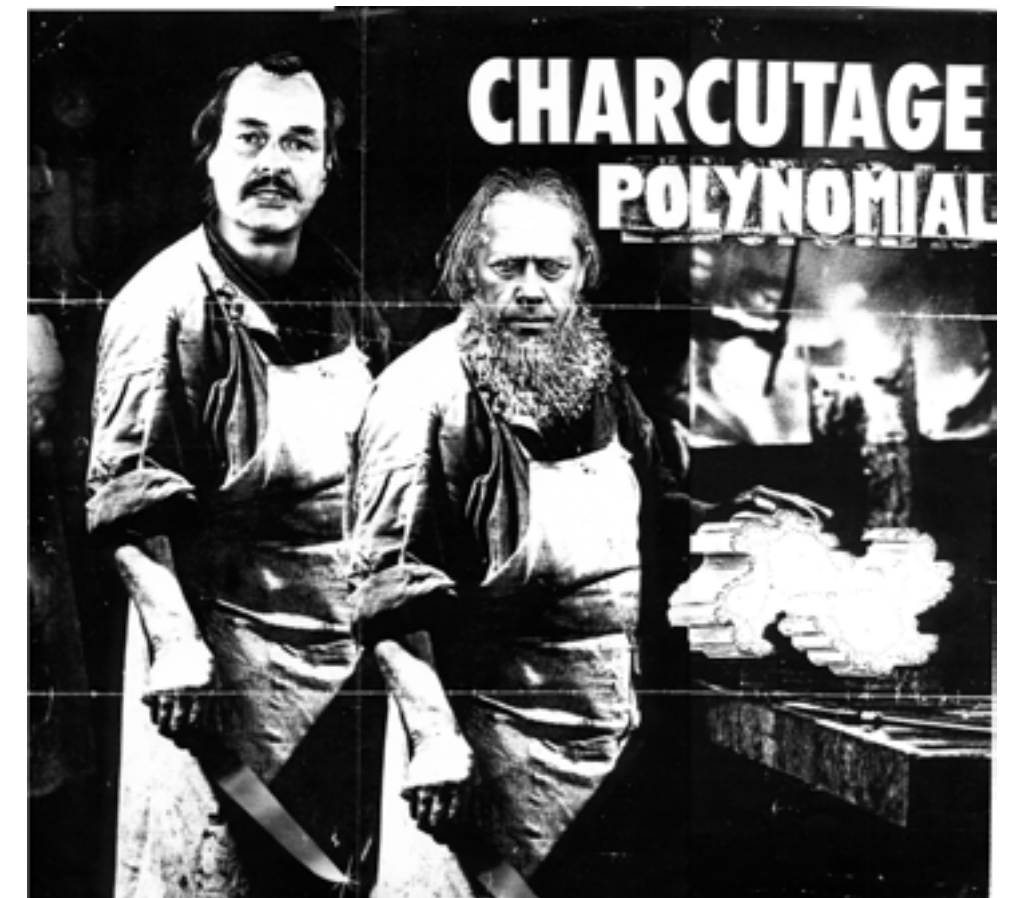
figure in figure 7, labeled “the fat rabbit,” is composed of five larger almond shapes and small, rounded buds. This basic figure is transposed into new configurations of serpentine lines in the surrounding drawings. Douady’s imaginative figures, drawn with great verve, show that research in this field of mathematics, first opened up by computer graphics, involves working with pictures even when the computer “blinds out,” the formulas having become too complex for digital representation. At the time Douady drew them, the various curlicues he imagined were as yet nonexistent in a mathematical sense inasmuch as their mathematical properties were not accompanied by a rigorous proof. The proof would be the job of someone else: What Douady’s drawing disclosed was a realm of possibility, a potential mathematical scenario. Dan Sørensen, a doctoral student of Douady’s, finally provided the proof of the scenario’s existence—and of the efficacy of Douady’s loopy imagination—in his dissertation (Sørensen 2000).

In Douady’s sketches, the backward S-curve that the Bourbakists once placed in the margins of their *Éléments de Mathématique* (Samuel 2007) celebrated not only a return but an ecstatic revival. They also came to be symbolic of the factual force of drawings, for it was possible to prove mathematically the existence of the curlicue dynamic. Douady can thus be identified not only as a second-generation Bourbakist, but also as an exquisite Bourbakist draftsman.

Computer-graphic representations of fractals, especially those based on combinations of polynomials, are characterized by complex filigree structures around the edges. In order to study the relative position of their individual components, mathematicians draw “thought trees.” For example, as a combinatorial study, a drawing by Jean-Christophe Yoccoz from 1983 represents a small portion of the Mandelbrot set as mathematicians “see” it (fig. 8 right). In his drawing, the calculation becomes a kind of hybrid between a tree and a molecular structure that fills the entire sheet. A base function is seen at the bottom edge of the picture, a curving line reminiscent of a small hill. Rising up out of it is a gnarly trunk with straight and curved branches that sprout tiny twigs in every direction, an organic tangle whose leaves or fruits are numbers. Each of the tree’s branches is the expression of a calculating thought movement, and together they result in a complex dynamic of their own: The upper right is dominated by rhythmic lines curving to the left, repeating the movement of the exuberant formation in the upper left. Douady explained the combinatory practice as “tree drawing,” which represents one of the basic methods for working with polynomials and serves to tame the structures visualized in computer graphics (Douady 2005: telephone interview). Mathematical draftsmen

thus become engineers of a computer-generated observation room; in drawings, digitally calculated abstract space is surveyed and virtually reconstructed. Computer graphics may have been required to disclose these realms to mathematics, but in scientific debate they had to be interpreted in drawings. Though the “realm of pure thought” (Hilbert 1983: 27) in which the world of numbers might map itself seemingly unaided was accessed with the help of the computer, the drawing was essential for the return of the eye, which, on the contrary, in the view of many of his contemporaries was primarily manifest in digitalized mathematics.

Drawings will always play an indispensable role in mathematical thinking at the theoretical stage. Yet the popular media are dominated by computer graphics that by and large mask the process of coming to understanding through drawing. To the media public, the presumably objective computer graphic is better at illustrating phenomena from the exact sciences. But the shape of the graphic has most likely been designed by a drawing hand, outside of public view, and only later presented in polished form.



Of course, it is possible to think in formulas but arriving at understanding can also be a matter of fiddling with pencil and paper, making drawings that lead to a fruitful collaboration between the computer and the eye and thereby add to mathematical knowledge.

Douady ended the article in which he presented his theory of mathematical *disegno* in 1982 (published, ironically, in the *Séminaire N. Bourbaki*) with a highly technical demand: Construction on the foundations of the “chirurgy of dynamic systems” must continue (Douady 1982: 62). His wording can be related to a humorous photomontage from his private archive [fig. 9], a spoof on a French leftist poster of the French Communist Party (PCF) in which his colleague John Hubbard and Adrien Douady have taken the places of the Gaullist politicians Jacques Chirac and Charles Pasqua. Douady’s left hand rests on a three-dimensional drawing of a Julia set, which appears to hover slightly above a table (where in the original had been a map of France), while Hubbard is brandishing a butcher knife in his right hand. They are gazing at the viewer with determined expressions. The two mathematicians’ intention is spelled out in large letters next to their heads: “Charcutage Polynomial” (“polynomial slaughter”). This poster is a lively indication of the sparkling sense of humor for which Adrien Douady was widely known and appreciated. But there is a deeper meaning hidden in this joke: Had the two mathematicians not laid a hand and a pencil on the “slaughterhouse of the Julia sets,” they would not have derived any information from the raw digital shapes of visualized mathematics. In this context, drawing became a mode of mathematical seeing: It was the linear that made the non-linear visible.

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# Schneckloth | Relational Gestures: Three experiments in collaborative drawing

## Abstract

Drawing, as discipline, object, and action, tangibly sites the communal gesture, by enabling a physical forum for an embodied aesthetic exchange. In both my studio and teaching practice, collaboration and the gesture play a vital role in the development and realization of relational drawing projects. Here, I examine three projects that frame interactivity, touch, and embodiment in the context of participatory engagement on, and with, a drawing's surface. In each, the gesture is cast as the mark and action that bridges artist to audience, body to material, and private to public expression.

## Biography

My practice is motivated by the question of how science, imagination, and the body inform one another through the activity of drawing. By combining the visual languages of biology, geology, and physics into large-scale, mixed-media, and interactive drawings, I create images that speak to the physicality of markmaking, the embodiment of memory, and our interpretation of natural systems and phenomena. These drawings have been shown throughout the US, South Africa, and France; my essays on drawing and embodiment have appeared in the *Journal of Visual Culture*, *Visual Communications Quarterly*, and the *Manifest*

*International Drawing Annual*. I hold an MFA from the University of Wisconsin, and head the Drawing Program at the University of South Carolina.

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## Introduction

“...Collaboration is a performative and transformative process: the sudden need to cross the familiar boundaries of one's own experiences, skills and intellectual resources to enter nameless and foreign territories where abilities that had been considered 'individual' marvellously merge with those of others. In this sequence, outcomes and processes follow an inverse relation as do the relations of power. For what comes about is not the 'granting' of access, but a recognition across the board of those involved in the process, that it is the unexpected multiplicity and uncertain location of the points of access that is at stake in the exchange.” (Schneider 2007)

While throughout its history drawing has been associated with the same authorial singularity found in painting and sculpture, it is also an art form that readily lends itself to multiple sensibilities and bodies working in tandem and en masse. From Dada's legion of Exquisite Corpses to handheld apps like Draw Something that provide platforms for online group sketching, collaborative drawings hybridize the aesthetic visions and technical skills of multiple makers into a unified outcome that often remains open to input and change.

In taking up the larger question of how practice and pedagogy interweave through drawing, I wish to address two concerns that drive my studio research and teaching alike: collaboration and the gesture. Both are appeals to, and enactments of, a relational aesthetic that emphasizes and encourages participation over spectatorship and dialogue over didacticism. By embarking on a range of drawing projects that fit along a collaborative spectrum, I raise questions regarding authorship and ownership, risk and reward, and the distinctions between interactivity and collaboration. In each undertaking, the gesture is cast as the action and the mark that enables us to relate to one another as participants in a shared creative process, be it enacted in the studio, gallery, or educational space.

Here, I speak to three projects: *Open Gestures*, a series of interactive drawings that are activated by participants' physical touch; *Tractus*, a group drawing process that brings together scores of participants on

one page; and *Daxology*, a three-person collaboration that unites drawing, video, and sound. In each, I investigate how the gesture enables a relational marking experience to unfold. How do gestures evolve (or devolve) as they migrate between participants in a collaborative drawing? What common gestures and visual logics emerge when working collaboratively? Is the individual mark subsumed into the mass image, or do signature traces remain that can be interpreted in the context of the whole? Where does ownership reside? What is relinquished or gained in the collaborative process, particularly when the emphasis shifts from drawing practice to pedagogy?

## Gesturing in Common

Consider a network of linked potentials: body to material, artwork to viewer, artist to audience, and gallery to community. The desire for multidirectional flow between these sites, as enacted through the gesture, inspires and feeds my hope for a more consciously relational practice. Within drawing, the gesture plays a particular role as that which animates the still image, an essential mark that captures both observed form and felt experience. As an embodied mark, the drawn gesture invites a viewer into an image, calling for an aesthetic interpretation through the feeling body. In *Migrations of Gesture*, Carrie Noland observes, “...Gestures offer opportunities for kinesthetic experience; they ‘innervate’, or stimulate, the nerves of a bodily part, and thus allow the body to achieve a certain awareness and knowledge of itself through movement.” (Noland 2008: p. ix) While gesture in the context of drawing may most readily apply to the mark on the page and the action that produces that mark, it may also be defined to encompass the idea of a demonstration of intent, as in a gesture of friendship, or a gesture toward community. Collaborative drawing allows for both interpretations of the gesture to co-exist and inform one another, understood here as a gesture toward inclusivity.

Long before I made interactivity an explicit tenet in my studio work, it pervaded how I thought about how drawings could be created and understood. While a visual discipline, it has always, for me, been an activity *between* people, as viewers, makers, or models, and driven by an awareness of physical touch and bodily movement. I also hold to the conviction that drawing is a discipline through which multiple forms of expression can be channelled. As drawing is often cast as a site where the thought process is made manifest, so too is it a site for transdisciplinary inquiry. Drawing allows for relationships between ideas, people, and modes of production to unfold in the course of both making and viewing.



While by no means a 21st century invention, intersubjective creative exchange is cast into theoretical light by Nicolas Bourriaud, who, in *Relational Aesthetics* (2002), frames an ethical system of relationships between makers, viewers, and viewers-as-makers, as enacted through interactive, collaborative, and open-system artworks. A *relational aesthetic* operates when viewers move from a state of passive spectatorship to active participation, and when artists initiate “art encounters,” as opposed to making static objects with a predetermined flow of meaning or content. A relational aesthetic as described by Bourriaud is unpredictable, democratic, evolving, and relies on a sense of openness and risk. While he does not identify drawing explicitly, I believe the discipline is aptly suited to enable such a relational aesthetic to evolve.

Questions raised by critics relate to where authority and authorship reside in relational undertakings, and contend that a claim to interactivity is often an empty gesture, perpetuating systems in which the artist or institution still maintains creative or financial control over process and product. In my own practice, I question whether there a threshold for “collaboration,” and am curious about how we make a distinction between interactive, collaborative, and participatory artworks. It is too easy to call any drawing that has been touched by more than one person a collaboration – there are assumptions about the sharing of creative vision, of signature, of authorship, of decision-making authority that are implicit in our notion of a balanced collaborative undertaking. How is each of these three drawing projects that follow collaborative, and to what end? Is there a form of “pure” collaboration in drawing? In each project, there is a moment of opening in which the private creative act is made public, and both object and idea are placed into interactive motion. Each project demonstrates a different model of how a relational moment can unfold, each with a different balance of creative control.

#### ***Open Gestures* (2008 – 2010)**

By creating interactive “drawing encounters,” my hope is for drawing to explicitly serve as a site of participation and invention, as viewers physically engage with art objects and each other. The gesture abides in the work as embodied mark and an opening for material, aesthetic, and conceptual engagement. In the series *Open Gestures: (Re)Active Drawings*, each piece affords a different opportunity for a participant to interact with the image in the gallery through his or her bodily contact. Whether by casting shadows, dragging and dropping iron filings with magnets, sifting through grains of sand, magnifying fragments of images, or floating drawings on a bed of air, viewers become agents

and drawings become encounters. In this undertaking, the viewer’s gestural act activates both the image at hand and questions regarding the material concerns of drawing itself.



Fig. 1. Installation view of *Open Gestures*

Fig. 2 and Fig. 3. *Interactive drawings: Attraction and Aeration*



*Excavation* is the interactive piece in the series that most explicitly raises awareness of how the gestures of drawing are initiated, repeated, interpreted, and re-expressed on the drawing’s surface. The relational movement between artist and viewer here is at its most fluid, as a spectator must physically re-enact the gestures of making on the surface as a means to visually access the image. The image, a network of my

Fig. 4 and Fig. 5. *Excavation* (overleaf – base drawing and final interactive format)



Fig. 5 - Excavation



repeated hand-drawn marks in charcoal and graphite, is obscured by tens of thousands of small plastic spheres. Viewers are encouraged to lay their hands into the material, to push, pull, sweep, dig, to uncover the original drawing that lies beneath a thin protective covering. While the original image does not undergo transformation at the viewers' touch, it is, in essence, recreated through the body of each viewer, as she is engaged in a dance with the material that mirrors the process of

making. The full drawing is never entirely disclosed, rather only the fragments that are activated by the viewer's gesture.

In bringing to bear corporeal changes in pressure, direction, intensity, and speed, one is able to experience the history of the drawing and to somatically echo the process of drawing in one's own hands, hips, shoulders, and arms. Without accessing the gestures of "uncovering," the drawing remains inert and lifeless. After manipulating the surface, viewers comment that they feel their own bodies more intensely, the sweeping flow of muscle and matter, and the connection between the movement of the hand and the resulting mark.

By integrating sculptural elements that can be manipulated by a viewer, invitations to touch, to make choices, to redirect vision, my intent is to bring the body more fully into conscious play, to engage a beholder through more than vision, and to mobilize an embodying spectatorship. In making explicit the material concerns of drawing and the body's capacity to make and remake a mark and, with it, a meaning, the artworks afford the opportunity for a viewer to inhabit not just the space of the finished image as shown, but the space (and time) of creating the drawing itself. The notions of contemplative distance and optical consumption are complemented with tactile engagement and bodily contact as a mode of aesthetic knowing. The shifting of parts reveals new possibilities for connection and coherent imagery, as the drawing resides in flux, in a state of becoming.

The risk entailed in this mode of collaboration cuts both ways. In the showing of this work, I have seen new combinations of forms that have shocked and delighted me, as participants reconfigure elements into surprising combinations. I also found that often, when encouraged to touch and interact with artwork, people test the physical limits of the structures, with touch bordering on destruction. This discovery highlighted the somewhat narrow range of interactions that I had imagined for each piece. An invitation to "gently manipulate a surface" turns into a violent episode of seeing how much pressure the structure can bear; games between participants played on a drawing's surface often end in broken parts. Here, I remind myself that I committed to the risk that accompanies relinquishing a degree of control by inviting unmediated public interaction, and that wilfully destructive touch is very much on the interactive table (here, quite literally). The question also remains, and is highlighted: is this a "collaborative" drawing, or simply interactive? What level of input constitutes a proper collaboration?

### ***Tractus (2009 – present)***

Accepting, or even embracing, the risks that accompany public interactivity, I believe an invitation to a viewer to physically alter a drawing's surface is an important way to enable a larger understanding of gesture in both action and image. Taking this beyond the interaction afforded by *Open Gestures*, I developed the *Tractus* drawing workshops. As an experiment in guided intuitive marking and shared creative labour,

Fig. 6 and Fig. 7. Early stages of *Tractus*

these group drawings speak to the limits and the potential of collaborative gestural drawing. They illumine how the individual mark is subsumed into the collective image, while that image still projects an overall sense of unique character and composition.

Working with groups of ten to two hundred participants, these drawings follow nearly identical sets of guidelines, and are open to any level of skill or ability. Each drawing is executed on a large roll of black paper with wax crayons and coloured pastels. Participants are asked to follow all directives as closely as possible, while embracing the possibilities within each rule. The formal ambition of a *Tractus* drawing is to have a physical document of a communal experience of marking, working by rules in which repeated physical gestures are layered and woven. The questions most in play in *Tractus* relate to how individual drawing gestures manifest and evolve through the image-making process, and how they may be interpreted in the context of the finished whole. How do prescriptions for particular formal outcomes result in a consistent set of gestured marks? Into what patterns and habits do our drawing bodies default?

The first layer of marks is generated through frottage. This is done quickly, and is the first moment to see the scope of physical gestures the material and conditions will allow. Drawing on hands and knees, par-

ticipants experiment with the pressure, speed, and direction of the mark as a way to coax a range of contrasting visual effects from a small piece of white crayon. What results is a random array of thousands of small marks that are generally uniform, but with some variation. Participants are next instructed to connect points using a line that meanders from edge to edge and back again – there are a limited number of ways this can be executed, yet the variety in this step is greater than in the first.

In the third phase, participants join with another person on the surface and devise a game that builds upon the existing marks. Each pair's game must then evolve to combine with another game being played elsewhere on the surface. Here, the gesture is at its most liberated, resulting in a diversity of mark and sign; the games generate geometric figures, viral visual patterns, self-contained logics of play, and delicate renderings of realistic subject matter. There is no limit as to what the game can be, only that it consist of drawn marks on the paper surface and is played *between* participants.

Participants then examine the visual chaos of the marks, lines, and drawn games, and collectively agree on three to five existing visual forms to be replicated throughout the whole. Those are drawn by all, repetitively, with the intention of further overwhelming the surface,

while at the same time creating visual passages and flows, moving toward compositional integrity. The drawing continues to evolve with the introduction of colour and black mediums, to edit and accentuate elements of the composition.

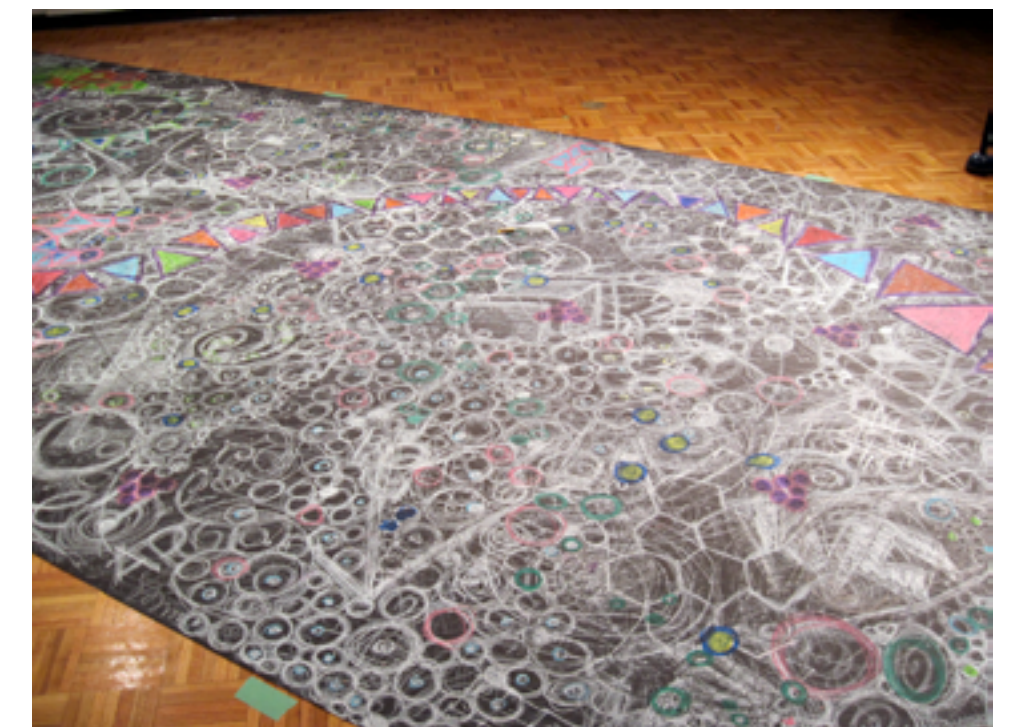
The resulting drawings exist as layer upon layer of gestured mark and, while fundamentally different from one another in character, demonstrate how the drawing body occupies a particular zone of ritual and visual practice when working collectively toward a common graphic end. With a large group of participants, the forms that tend to emerge most frequently are basic geometric shapes: circles, triangles, squares, spirals, and polygons. These are perhaps the most readily available and useful visual tools for the gaming component of the drawing, as they are shapes that can adapt to the rules in play and provide any number of functions and meanings. That we can make these shapes so intuitively, without thinking about what is required for our body to create them, is what grounds them in gestural territory; they are instinctive marks that issue from our bodies, manifest in our deepest history of visual expression.

To bring them into concert here, over a short period of time with a large number of people drawing, underscores the innate ability we all have to create images with integrity and depth using the simplest common, yet highly adaptive, drawn gestures of sign. While it is tempting to categorize the simple geometries as the lowest common denominator

Fig. 6 and Fig. 7. Early stages of *Tractus*



Fig. 8 (below), Fig. 9 (right), & Fig. 10 (overleaf). Details of early, middle, and late stages.





of what we all know how to draw, I hold that it is the “common” aspect of the shapes that lends itself to ready collaboration, and allows the opening for a group gesture. The *Tractus* drawings perform as an arena to hold our most basic graphic signs, a space in which marks can replicate and evolve in relation, and in response, to one another. The drawings afford a way to arrive organically at a drawn language that can be accessed by all participant-makers; the group determines what gestures can be accessed by every hand, regardless of skill level or experience, and the drawing unfolds from that point forward, an inclusive tract of common marks.

(Figures 11 to 16 are overleaf)

#### ***Doxology* (2011 - present)**

A feature of the *Tractus* mode of collaboration is that individual expressions are often subsumed into the whole. One artist’s signature mark is not necessarily privileged over another, and moments of inspired drawing can be buried in the visual cacophony of layered image. In a three-person collaboration begun in 2011 between video artist Patrick Nugent, sound artist Nathan Halverson, and myself, the drawing that evolved demonstrates the integrated nature of collaborative logic and the aphorism of the whole being greater than the parts, as each part remains distinct.

The process began with Nugent’s idea to combine a large-scale draw-

ing with projected digital and video content. My role was to design and create that drawing, a 10’x15’ physical ink-on-paper framework into which the digital imagery would be projected. Halverson had previously composed a sound piece as an accompaniment to my *Open Gestures* series, as a sonic reflection of the qualities he perceived in the drawings – dark, biological, watery. I drew the form for *Doxology* both to fit the idea that Nugent was proposing, and also in response to Halverson’s audio. His sound played in the studio on a loop during the entire drawing process, influencing the evolution of the form and the quality of the constituent marks. In addition to inspiring the tone

of the drawing, an edited version of Halverson’s soundscape set the timing and tone of Nugent’s video content. As the sound rose and fell, or shifted in intensity and rhythm, Nugent caused the digital imagery to move and change. (Fig. 17 & 18 in two pages)

What resulted was an integrated chain of influences: Halverson composed sound in reaction to my drawing, I drew in reaction to Halverson’s sound and Nugent’s idea, and Nugent created video in reaction to image and sound. Alone, each component is a unique invention that holds aesthetic and creative merit, but when combined, this sonic-digital-





*Top & bottom left: Fig. 11 & Fig. 12. Tractus at the University of Oklahoma – 150 participants*

*Top & bottom centre: Fig. 13 & 14. Washington and Lee University – 30 participants*

*Top & bottom right: Fig. 15 & 16. University of South Carolina and Princeton High School – 50 participants*



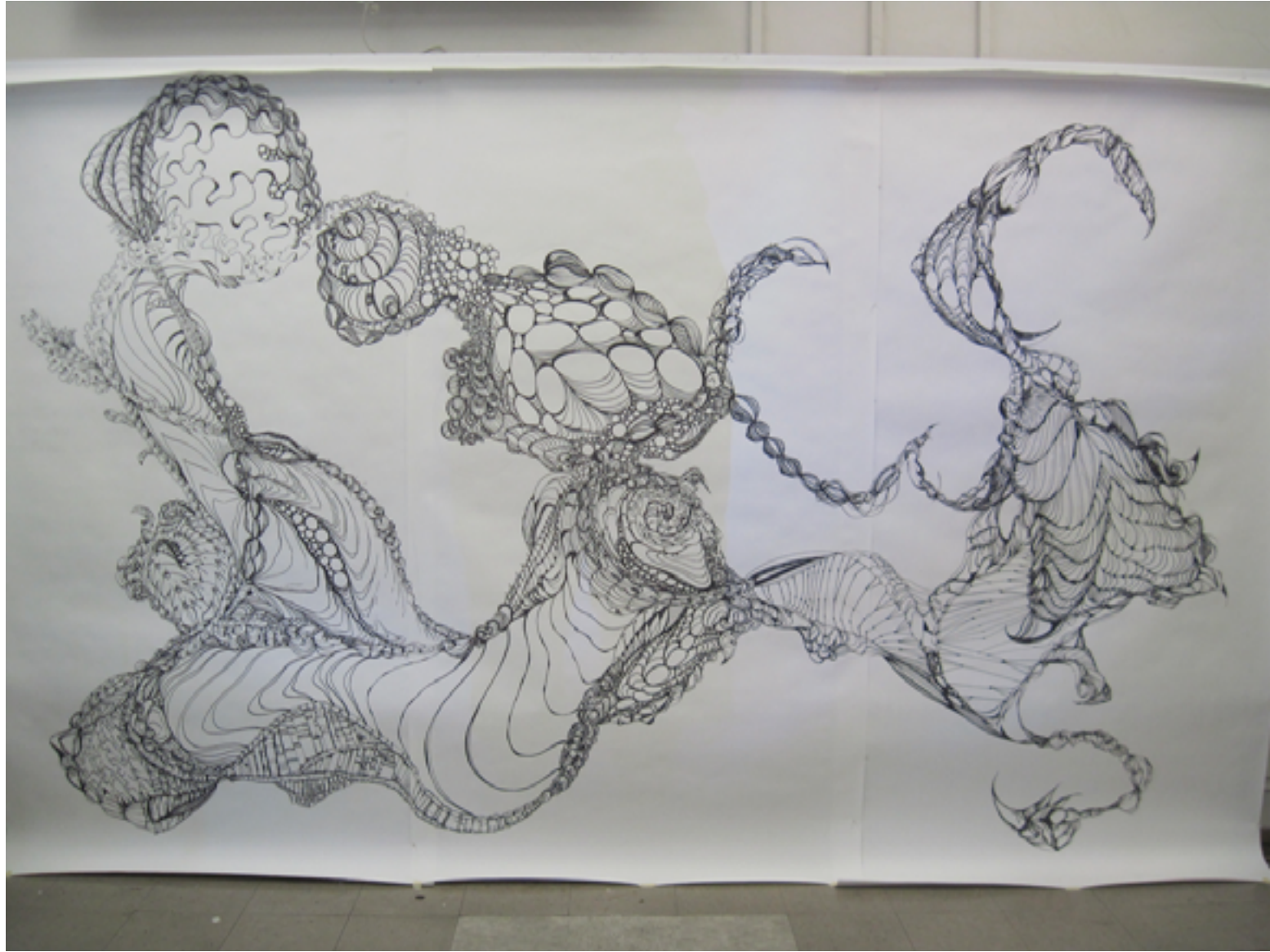
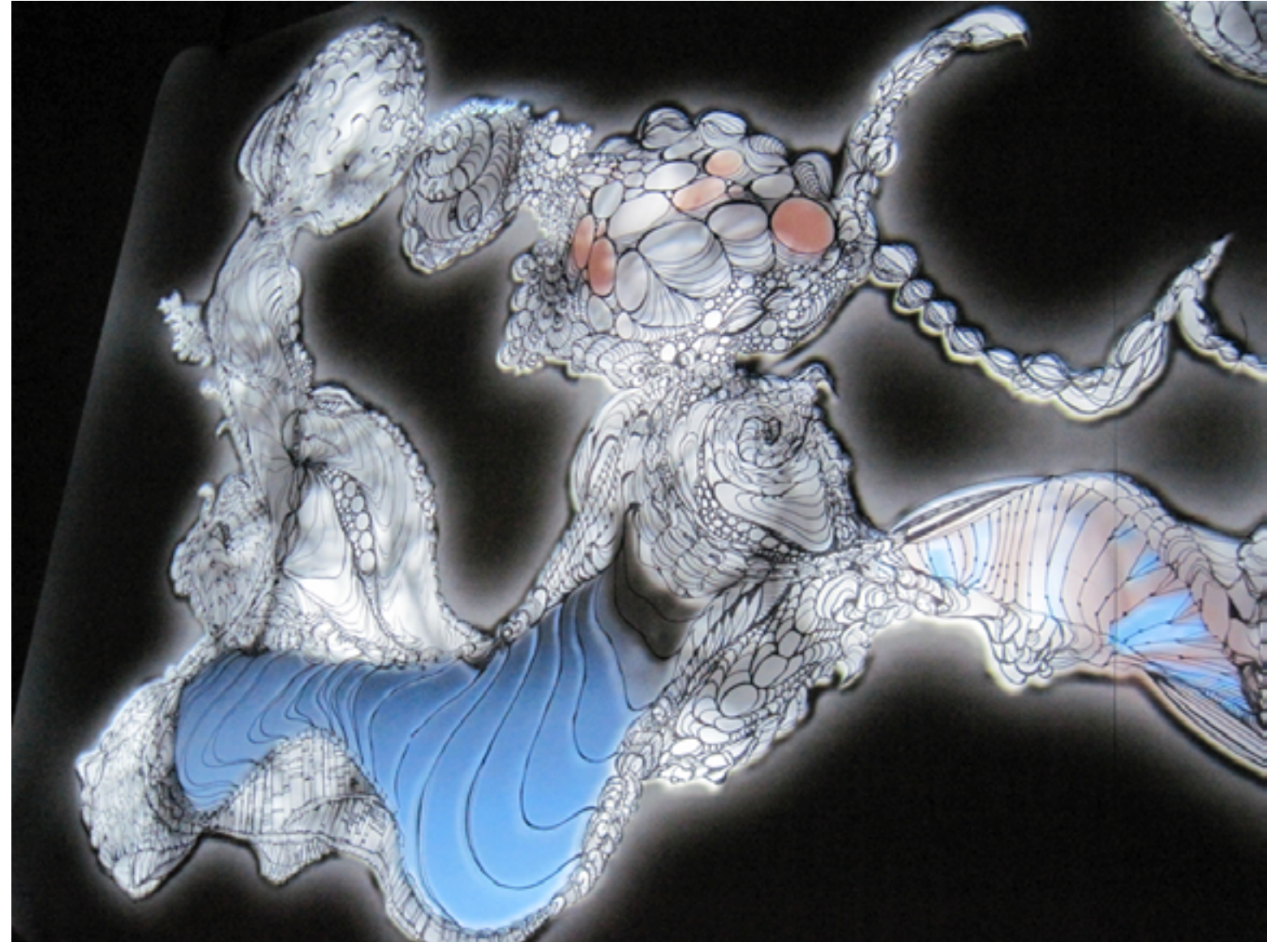


Fig. 17 (left) and Fig. 18 (below)



drawing exceeded all our individual capacities, and stands as a hybrid object, the result of an entwined creative process. Each technical contribution is a reflection of the three artists' specializations, and is sharply distinct within the project; but because of the willingness to work so explicitly *in reaction* to each other and to relinquish a strict sense of creative control and singular authorship, there was a unity to the collaboration that mirrored what more readily occurs in shared music or performance. While the *Tractus* drawings operate with the analogue of a full orchestra with a conductor, the contributions to this collaboration remain distinct and personal, as in a chamber ensemble.

The gesture here is manifest in the repeated sounds, marks, and undulations of light, a call and response between each element in the equation, a shared vocabulary enacted across three different media of expression – ink, video, and sound. Risk is contained to what happens between the three artists – there is not an opening for the public beyond the interpretive act of viewing. We consider this a work in progress, recognizing the potential to do more with the piece going forward. Given access to interactive motion technologies like Kinect, the question now becomes one of opening it up to the hand of the viewer, enabling a degree of participation. Hand gestures of a spectator could easily redirect light and video over the surface, or speed or slow the soundscape. In light of the two projects above, this raises the question of what could be gained or lost in the opening, and in replacing the distinct authorship of the artists with that of the crowd. Would the gestures of public participants diminish the piece, or further encourage a sense of investment, wonder, and immersion in the artwork?

### Conclusion

Each of these three projects holds at its core the question of how we, as makers and interpreters of drawing, create and sustain an embodying gestural mark when working in concert. The drawn gesture enables a conversation between bodies to unfold over time, on a surface, within a space. It transmits the gratifications of material touch from the privacy of the studio to participants in a public gallery, it connects casual collaborators on a drawing's surface as we author visual signs, and it carries aesthetic intention between modes of production and expression. In each project, it is through the repetition of a particular gesture, and the echoing between makers of the constituent actions of drawing, that drawing enables a forum the relational creative act; I see, touch, and move with a particular graphic intention – you see, touch, and move in

response, to echo, or to innovate. Our shared body of gestures becomes the drawing, collaborative object and experience, product and process both.

The question of the “collaborative threshold” remains open. For the past decade, the emphasis placed on nominal interactivity and participation in the context of new media has become a given, with a single click constituting a contribution to a whole. As an artist and an educator, I believe that almost any degree of personal, physical, investment in a process changes how we understand our own sense of agency, and with it, the larger enterprise of creating drawings that carry experience and meaning. Democratic drawings may not always produce brilliant visual results, but the process may create moments of unique and enduring insight. After running my first *Tractus* workshop in 2009, with 140 participants, I wrote in my journal:

“Social metaphors emerged by the handful. The dyadic formal division [in the drawing] was too extreme to be sustained if it were to remain one piece, so compromise was required. That took the form of a tenuous bipartisan drawing effort that was quickly buried by sea of heavier marks that indeed unified the piece but rendered it less nuanced. Tradeoffs occurred. Not everyone was pleased. Levels of personal investment and ownership varied radically, and the marks were an index of engagement. Moments of consensus were frequently reached, but then practice didn't necessarily follow from agreed-upon intention. Numerous parallels to the health care debate were drawn, in addition to thousands of marks. Many people drew big for the first time and loved it. It was a very good day.”

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# Simões | Research, through and from the drawing in learning context

## Abstract

As the drawing can be an instrument of research and research?

We intend to bring to discussion some key points about pedagogy and research in drawing in the digital age.

Anticipating that digital paradigm has affected the teaching/learning relationships, as well as affected the access to information and communication. In the context of access to the communications network, we intend to identify possible changes that occur in teaching drawing when we introduce a pedagogical methodology also expanded it to the network.

Inserted in the context of technology and education, and taking as a basis for our study the discipline of drawing in your project function, that is while speculative language and illustrative of the idea, we present some examples of tools available to support b-learning, and how these can contribute to a more participatory and collaborative education even when it comes to teaching/learning which has a strong tradition in person such as the artistic education.

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## Investigate vs draw

*What do we mean by research?*

*How we to investigate?*

*How we show the research that is inherent in artistic perform?*

These questions underline the importance of research as process into artistic field. In teaching/learning of drawing, that is the focus of our subject, understanding how our students are investigating and how they render knowledge sounds matter of great significance for our study that propose approach between net and drawing teaching.

Is not unanimous the use of the research word in the field of artistic knowledge. There are different positions. Research is usually associated at scientific issues and as such, seems not to be the term that best describes the process of learning and knowledge obtained through artistic practice. Could simply define the artistic research like the practice itself, however, we are not sure that is true in the context of teaching.

We began by clarifying the distinction we do between artistic research field, and who is investigating in arts. For us there are two different situations; research in artistic practice, and academic research. Have different objectives that result in different objects of knowledge. This approach based on Frayling proposal (1993) wants like the author's show the possibilities at art research. For Frayling<sup>1</sup> there are three possible kinds of research: research into art and design, through art and design and research for art and design. For this article we reflect through art and design research by intrinsic necessity that exists between researches, learn and teach in this particular case.

In this article want reflect about research through art and design by intrinsic necessity that exists between teach and learning drawing.

Frayling tells us that research for art, doesn't exist attempt communicate through verbal language, but rather, appeal the senses and the imagination to do the reading of this subject. Frayling refers to the object like outcome of the investigation.

In the context of teaching and learning, the contemplation moment that

<sup>1</sup> Division proposed by Christopher Frayling to define the possible investigations into art in *Research in Art and Design*. London: Royal College of Art, 1993. The author divides into three possible ways on how to investigate in art and design.

Research into art and design; where to fit the works of historical research, aesthetic, or other possible theoretical frameworks that if they wish to give to art and design.

Research through art and design; where fall most of the works that have as purpose to verify and understand the practice linked to the theory, not the external point of view the problem as in the case of research into art and design, but linking and contextualizing knowledge both with a single.

Research for art and design; research results on a subject. Where the main objective is not the communication through verbal language, but in the sense of call to cognition and imagination.

exist when we see and feel an object of art should not be the key point or important. More important than the result, is the set of procedures in the field of conceptualization and representation. From the point of view of teaching, research processes in the context of artistic learning are to be taken into account as part of the development of the student, their ability to absorb powers, in the multiplicity of ideas and ability to propose new approaches. It is precisely for this link between practice and result, which often becomes difficult to show the methodology used in the process of artistic production.

Taking as an example our experience as teachers, found that it is through practice, of doing, the accident, the errors, the criticism, the conversations with the teacher or classmates, the instruments used, among many other variables that students will outlining and giving substance to the project. Divergent thinking, as Robinson (2010) say on Conference "Changing Education Paradigms". Is the way of thinking with multiple answers rather than a single way, get different ways of interpreting the questions, think laterally instead convergent thinking are fundamental factors to creative thinking and usually present in thought of artistic process. Is non-linear organizational structure of the creative process.

As the example of how to think and work methods in the artistic field can be multiple and varied are the RSVP<sup>2</sup> Cycle (resource, valuation, performance, score) that Halprin drew in 60 years. A tool based on model that the process is directly involved with the artistic practice and in the creative resolution of problems. Is cyclic model, rather than hierarchical and linear, that emphasizes the persistence and the process, instead of the string and getting results. (Fig. 1 overleaf)

In the Halprin cycle the order is arbitrary. Don't exist one correct start point. We can enter through any point, and move us in any direction. The cycle can be repeated, overlapped or used partially. The sequence is quite variable, depending on the situation, artist and objective. As project methodology, the RSVP cycle does not intend to systematize and organize, but "liberate the creative process making the work visible process".

The closed cycle is an idealized situation. There are activities where the

<sup>2</sup> [R] Is the initial to Resources (resources). That are kind of inventory that ranges from the human and physical resources, materials, space, the tools, the resources available, but also the objectives, motivations, needs, individual Poetics, etc, etc, etc.

[S] Refers to the field of Score (to count; pitch), which here is understood as representing an activity that will be develop for a certain period of time. That includes, scripts, sketches, notes, diagrams, notes, etc. These not only serve to describe or activate a process. It also serves to monitor and make visible the development of this.

[V] Designates the Valuation tools, emphasizing the sense of action (action value). Is the point of the cycle where the motivations and the initial resources intersect with the decisions. It is also at this stage to set out the possible alternatives to the process represented by the staff, and their validation.

[P] Is the initial Performance, or realization, and refers to the actual implementation of the project.



Fig. 1. – HALPPRIN, L. (1969). Front page of “The RSVP Cycles. Creative Processes in the Human Environment”

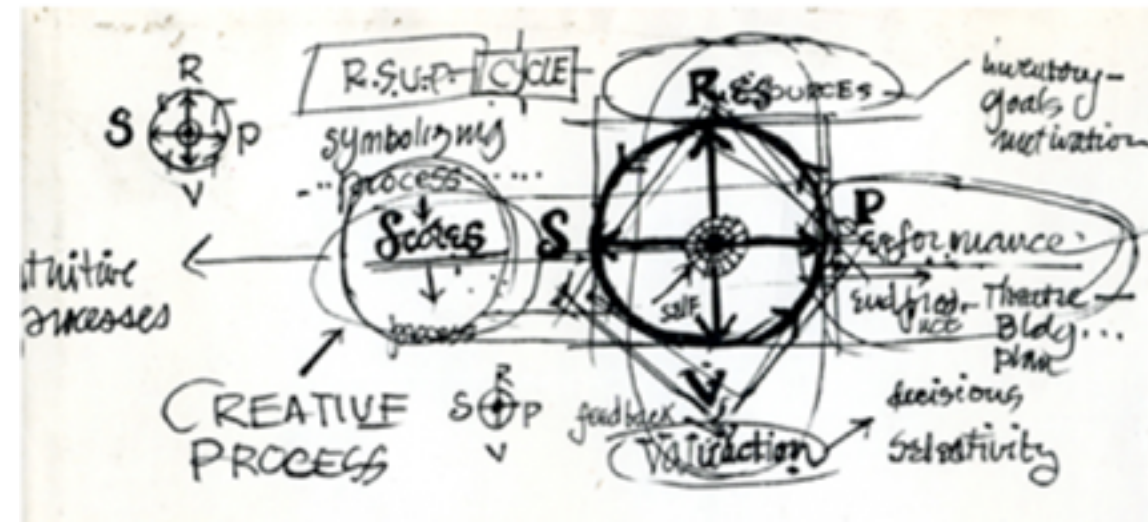
full cycle is not desirable. But this does not exclude the importance of knowing at what point we are in. As in any project, the key is to know where you go, not where it will arrive. If, for example, someone enters directly by Performance [P], is an improvisational situation, or the spontaneous response, is a vital strategy to channel creative impulses that might otherwise block (Halprin, 1969: 3).

The closed cycle is an idealized situation. There are activities where the full cycle is not desirable. But this does not exclude the importance of knowing at what point we are in. As in any project, the key is to know where you go, not where it will arrive. If, for example, someone enters directly by Performance [P], is an improvisational situation, or the spontaneous response, is a vital strategy to channel creative impulses that might otherwise block (Halprin, 1969: 3). The practice of drawing can be compromised with all points in the cycle, but it can also override the agenda (S) to (P); You can start with construction or performance, and from there to move towards task (S). This possibility of multiple starting points is strategy promoting the use of drawing on different fronts. Can be imaginary registers or representations through some starting place. The drawing can be present as a catalyst and language to think the project. That makes us think about what is really important in the context of learning if the result, or the process? How to build and develop creative skills our students? What are the mechanisms that we have to monitor and evaluate the research carried out by students?

How can we understand the mechanisms necessary for a more collaborative and participatory education, as we will find other mechanisms of feedback?

**THE MEANING OF DRAWING IN THIS CONTEXT**

Talk about drawing can be talking about an infinite number of possibilities involved with representation and realization, with the ability to project and materialization of reality constructed in the light of the context in which it operates. So in this item we dedicate particular attention to the meaning of “drawing” to stabilize concepts. A study of this nature requires particular attention to approaches that we want establish.



Before proceeding with the problems relating to the construction of drawing processes, we need to say a few lines, not on the definition of drawing, subject impossible parameterize, but on how the drawing can be thought on the context of this work. At the risk of limiting etymologically the meaning of drawing, leaving out other forms of definition, we find on Latin the origin of the word, that means produced on two-dimensional medium. This definition it is so short and synthetic that eliminates many of the important data to the understanding of the word design. The derivation and evolution of languages, contributes to different meanings of the word, as presents in his text Luís Martins on the etymology of the word drawing (2007).

There are several factors that contribute to the variety and ambiguity of the definition of drawing. The historical and temporal context, function, knowledge area in which it operates, the materials and the surfaces, are also conditions that affect the reading of which is drawing or not.

A closer approach of drawing meaning brings us to various fields of action, implying with concepts that are well beyond technical support issues. Considering the drawing as a framework and as a structure material, we can say that the drawing is the action of establishing knowledge, which has the obligation to give the body, form, show and make a public image. Drawing is in a broad sense, present, represent, make present, and make visible what speaks about drawing.

In fact the hybrid quality of drawing and his limits little defined, allows him the primacy for the visualization, driving and to opening the field to conflict between realization, knowledge and expertise. Nor all of the drawings have the same source, some arise from the need to demonstrating ideas, like notes; others have as purpose to solve the implementation

of an object, such as a sculpture or a House. The drawing in its procedural aspect has to accompany the thought, serving as an instrument of formation and verification of our records, as a means of identification and validation of the purposes. Another type of drawing appears as a necessity to produce new images in that registration and action of graphic production that are the result.

The drawing is not only the instrument through which we seek answers to the problems, the drawing is often thought visibility, origin of new issues, giving space to new knowledge, working as a “search engine”, which throws questions and tries to get answers.

Goes beyond the field of artistic knowledge the relevance of the image in relation to the thought and the imagination. Ferguson (2001) about the relationship between the thinking with images, “mind’s eye”, claims that most of the information that is thought is transmitted by drawings. Being that in engineering, as well as in architecture or design, areas in which the transmission of the message has to be made objectively, it is assumed also as a language able to translate and communicate the thought in image.

In initial form, drawing translates our imaginary into images without having to conform to a syntax or grammatical structure in which you can organize themselves as non-linear narrative, being however present a particular structure that may or may not be sequential and which may or may not be objective. Fundamental instrument to several areas of project, the quality that allows it to be the graphics environment and instrument with which form the world of ideas, to a world of presentation/representation, providing you with a performance over the centuries within the artistic, scientific and theoretical exploration that distinguishes it from other art forms.

Is one of the most crosscutting disciplines and through its flexibility, one of the most requested artistic practices by other areas. This is how art throughout history and continues to be a reality present today. This field of action, which operates with lines, stains, pictures, ideas; This possibility of doubt, the simplicity of means that need to take place, the effectiveness of graphic registration promotes the close relationship between thinking and doing. It is in this territory of confrontation, crisis, boiling, that through the design and develop ideas, we reject and approve other, that we have the drawing as the election. As Bismarck tells us (2001: 55):

‘ This space that lies between the idea and its image this space works the idea, that the rewrites, which puts in evidence the make, which calls and puts in the past and the future, the known and the unknown, the knowledge and recognition, tradition and new, graphic languages, its conventions and its limitations. This is the space where the drawing is done, this is the operating space of the drawing, the drawing if resolves.’ (free translation)

That is why we understand drawing as having a primary role as curriculum in teaching artistic discipline. As an instrument that mediates graphically and makes expand visual thinking. Has the availability of foster and develop critical reflections on the process itself and the educational role instrumental in developing critical and creative. Like Molina says, using Nauman words (Nauman .1991, apud. Molina, 2006: 44): “draw is equivalent to think”.

This statement that teach drawing is teach to researching, to doubting and asking, are not always clear. Referring to the problem that equates the relationship of language with the thought: is the language prior to thought? Is the language of thought? Coexist in the same plane? Is the language the domestication of thought? The drawing, risking his understanding as non-verbal language, understanding symbolically language as translation of an idea, which embodies in imaginary image through graphics, that is before any thought and other times it happens at the same time, and can explodes with stipulated standards and models.

In fact, the visual thinking begins not with the design on paper, but with the view. This first phase, which contrary to what we may think of does not depend on our ability to draw, but our ability to see though consciously or unconscious, see, is by itself an act to organize and establish relationships.

Also here in the territory of the communication in which the drawing is vehicle and language of visual communication, how greater is our proficiency greater will be our ability to communicate. To paraphrase Wittgenstein (2002) the limit of our world is the limit of our language. Visual thinking: see, to understand, to imagine and to present, in the process of drawing while non-verbal language, times when the realisation and the representation arise simultaneously and intuitively, where exist a close relationship between the thinking and represent is difficult follow the student projects in a collaborative context. Like Halprin proposed on RSVP Cycles.

#### *Practice-based research*

Research that develops along a process that involves practical skills finds

in this same practice its sustainability. Is commonly what we practice-based research, or reflective practice, action reflection or terms that we can find developed in Schön (1987).

In practice-based research, the relationship that is established between the do and reflection are inseparable. How can we think about a practice that does not exist, how can we opt for this or that way support our path is blank? How can we come in with our own ideas or even test our technical skills or abilities of representation if not executed? So, we are convinced that there is no other way to learn than by doing.

On the basis of procedural knowledge of Ryle (1949), in which the knowledge describes the operation, we would like to emphasise the importance of fundamental to the acquisition of knowledge in the area of artistic education. Where activities such as exercise, sense, test, cut, clean, etc., contact with the practice, leading to the acquisition of knowledge and skills that sedimentation over time are being automated so that the process becomes more fluent. However, the automation of the practice, that we understand how the domain of language may become counterproductive if not accompanied by a critical trial, we might be create a sustainable practice in the uncritical repetition of templates.

We found through our teaching experience that students who have greater proximity with practice, in this case the drawing practice, are more autonomous, they risk more in new compositions and new representations. If on the one hand, the repetition generated by the exercise and repetition of tasks can assimilate knowledge by another way can create the risk of a certain automatism at production if isn't being accompanied by a reflection and critical sense.

In the case study by Weisberg (2004) centered on the understanding that the practices and the exercises are directly connected to the ability in creative answers conclude that there is a clear relationship between the exercise and the expertise in the specific field of practice.

This survey that analyses the path of ten artists in the field of fine arts and music, over a period of ten years, shows also that ideas involved on resolution of some of problems are brought from previous reasoning processes and when incorporated in other contexts they are the solution.

Similarly, we can say that the practice promotes innovation and experience allowing the resolution and activation of new creative problems that are in the know, in the knowledge their own validation. Transposing the problematic for the individual ball, Weisberg (2004) concludes that an individual creative and other less creative use both your knowl-

edge to deal with the situations with which they are confronted. The big difference between the two lies in the level of knowledge they have and that is reflected in the way these give the answers.

An individual circumscribed to a kind of knowledge is limited to a small universe of possibilities, giving responses typically little varied and very similar when faced with different problems. While an individual with a wide and open knowledge, has more chance to have a set an answer differentiated and consequently more productive. How larger and varied is the knowledge, combined with the ability to relate and cross information, the greater the possibility to produce innovative and creative knowledge. This element is fundamental if we understand that the ability to understand and produce knowledge accompanies us during life, whether as professionals or just as people.

#### *TEACHING OF DRAWING IN THE CONTEXT OF THE DIGITAL SOCIETY*

Unlike the century in which he lived Ruskin,<sup>3</sup> 21st century isn't the century of letters written on paper placed on the mailbox waiting to being taken to your recipient. Neither support and instruments are limited to direct means of expression such as paper and pencils.

We live at a society that evolves from text to Hypertext (Dias, 2000). Our time, the Hypertext, is the moment of the interconnectivity of devices, which enable digital communication from one to one million around the world and almost instantaneous. A world based on electronic communication, networking, where the elements re several: pictures, sounds, videos, all available at a distance of a click.

We note that the democratization and ease of creation of multimedia content are creating new elements of sharing that are expanding the networking of knowledge. They changed paradigms and behaviors of socialization. They are being promoters for other forms of search and share information. All this, because we found on networks a way to share and find the most varied types of information and ways of communicating.

It was in this environment of technological expertise that teaching found space to enjoy and take ownership of tools available on the Web 2.0 increasing and encouraging students in the exchange and sharing of knowledge, making the process of learning more dynamic and collaborative.

<sup>3</sup> John Ruskin (8 February 1819 – 20 January 1900) was the leading English art critic of the [Victorian era](#), also an art patron, [draughtsman](#), watercolourist, a prominent social thinker and philanthropist. He wrote on subjects ranging from geology to architecture, myth to ornithology, literature to education, and botany to political economy. His writing styles and literary forms were equally varied. Ruskin penned essays and treatises, poetry and lectures, travel guides and manuals, letters and even a fairy tale.

These complex rhizome systems of links, very similar to the way of creative human thinking, as tell us Lévy (1990: 51), are particularly well suited to use in education. On the one hand, we have the possibility of individual participation and involvement in the acquisition of knowledge, on the other, the non-linear interactive features offered by interactive media encourage exploratory attitude amplifying critical and creative development of the student.

Most of our students were born after 90 years, decade in which digital devices and communication were being already implemented, for this generation that born with digital devices is normal being connected with world all the time.

The “digital natives” as the label and describe Palfrey and Gasser (2008) are young adults who developed and grew differently from ours, these were already connected on net. Are young people who communicate through mobile phone messages, that read and see the news on the computer and which more easily go to Google or wikipedia than go to the library.

It is important, us teachers to be aware of this reality. As Dias says (2008), the development of technologies, editing and sharing on the Web was the way for the construction of the change in design and organization of social networks, but not only, is also the way to organization from specialized knowledge networks where we can find room to discuss and develop knowledge.

Not only teaching and informal learning find here a place that focuses on discussion and sharing. The formal education also can to a certain extent find way to expand to the network.

Although we being promote the integration of information and communication technology, as of LMS (learning management system) on the models and practices in higher education, these practices are not yet vulgarized in the context of formal education. The “mismatch between formal education and the tools available on the web 2.0” (Eça, 2011) are a reality. The author, when referring to this mismatch, not says as according to an instrumental vision of the technology, but rather as an important means in education, pointing the Internet as person in charge of the new paradigms of teaching. Arguing that the digital is critical to student involvement in carrying out work in creating strategies that the approach of the willingness to learn, the expansion of autonomy, critical and creative direction.

According to the assumption that technology is a promoter of other teaching/learning paradigms, we propose as theoretical thought of

William (2005) who makes a reading of the importance of technology intrinsically linked to practice and the needs of the social subject, approaching from the perspective of social constructivism that we consider to be the epistemological model that best fits the approach of the problem.

For William, the technology is not being limited to artifact, to the instrument. If we search in the Greek origin of the word *techne*, means the craft, and *logos* meaning knowledge. It is understood that technology is a term that involves scientific and technical knowledge of tools, processes and materials created and/or used from such knowledge. The very meaning of the word implies a relationship between practice and knowledge. Assumes, therefore, the existence of a community active and constructor of their own interests.

Thinking about the issues of technology with a view to promoting other forms of participation and collaboration, these are only possible, if there is the need to use. We believe that only through their integration into pedagogical practices and propose other models and forms of communication, we will allow the educational system based its principles while respecting the individual’s growth as an organic process, promoting the conditions necessary for a critical mass capable of producing growth and creative.

As Robinson tells us (2010: edum) “we have to change metaphors. We can’t be more linked to an industrial model of education, based on a process of linearity, and normative.”

The experience has taught us that the artistic education is not at all a linear education. It has operational characteristics and dynamics learning that promote divergent and lateral thinking that makes expand the creativity of knowledge produced in practice/ reflection.

Because drawing learning have characteristics close from operative and experimental practices, exist a close relationship between students and teachers. On the one hand, we know that the arts education model is traditionally a face-to-face model, where the monitoring of work processes is based on a teacher/student relationship close and frequent.

However the transformations that happen in the world are not outside the reality of teaching of drawing. There is a social and economic context that points us in one direction, hence the relevance of ask what is happening inside of drawing with the new education curricula, with digital technology increasingly implemented, in which images, live and proliferate in a way never before possible, because they are no longer

tied to the physicality of the support, living in space, network access as both democratized in the disclosure.

The fact that the images pass to another dimension, virtual dimension, of the binary code, Immateriality, creates various possibilities that consciously or unconsciously certainly will have effects on how we relate with them, changing not only the ways of doing, as well as to imagine, because our imagination is also influenced by imagery context where we operate.

Convinced that technology promotes distinct behaviors and attitudes of so-called traditional means, by the possibility of immateriality we propose a reading of this subject centered not on technical demonstration, but, in reading the technology as a means, an extension that allows us to reach other points, the other answers to other solutions and intervenes in the process and the results, because no means is free, invisible or inconsequential. We reiterate the subject centered on technology as a means, as a vehicle for the realization of an idea and a speech.

Technology as a tool although could be subject of study in this context only interests us in the sense that is responsible for the proliferation and production of other images. It is understood that there is no difference in the ways of doing and operate in what is the drawing itself. To understand what we mean, by way of example a sketch is always a regardless of whether drawn on the iPad or sheet of paper. What distinguishes the tracing of another way to draw, is its ability to register through a graphic image, man-made form and not the instrument or the support in which it is held.

The contextualization is intrinsic to research in own methodology, we do not understand the isolated phenomena, but being contextualized in time and space.

Following this line of thought, drawing as practice and instrument is also a result of a past and a present of a context where tools and holders can change and create other possibilities, new forms of transposition of reality where there could be new models, both to represent and teach.

A pedagogical methodology that can integrate practices in order to implement the knowledge through time and in time, in contemporary times, as tells us Agamben (2009: 18). To understanding the habits that are changing our perception and representation are affected and affect the practice (Riley, 2008: 157). This consciences is one of the main functions of the drawing as a discipline in the artistic education programs.

The issues of teaching and learning, according to the current westernized society of technological framework, that supports the need for methods and pedagogical practices related to the social and temporal context (Riley, 2008: 157) assumes that in order to understand the world it is necessary to interpret it in the light of contextual meanings in time, in space, in knowledge and in accordance with the territories.

Mentioned earlier that the drawing has certain qualities and characteristics depending on the historical context and temporal, like their function, how it operates, of the materials and media that uses. Drawing is one of the possibilities to understand the reality contextualized in time/space and consequently making the interpretations of a reality that if you want to submit and materialize today, in which the speed of technological change and its absorption by the society turn on the paradigms originating new ways of doing and thinking.

Against this background, the teaching of drawing, have to be open to this reality and questioning yourself about current models of representation and therefore, about current educational models. In fact, as in art history, demonstrates with testimonials about the responsibility of drawing into thinking and questioning the installed templates, causing with this way of thinking changes and represent the conceptualization of reality.

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# Strucke | Embodying Symbiosis: A Philosophy of Mind in Drawing

## Abstract

Embodying Symbiosis: A Philosophy of Mind in Drawing gives information regarding Stucke's drawing process and its connection to artistic research as-well-as about her current project on Symbiosis State.

She explains how intention in drawing can reveal layers of intensity and move beyond the surface image to connect to research in making art. She further associates this research to her process of drawing for hours to achieve a state of mind, which translates into a systematic investigation for a creative methodology to gain knowledge, to learn interconnection, to create new forms, and to learn new systems.

Her artistic research communicates aspects of unknown territory in the mind-body connection. It also opens new pathways for new understandings in consciousness studies and allows for renewal of ideas in reflection and contemplation in human experience.

Stucke relates this research to her current project on Symbiosis State, which asks the question: what is symbiosis? The project explores how she embodies the idea of symbiosis through a drawing relationship interconnecting evolutionary biology, consciousness, philosophy of mind, and the imagination. By combining experiential and rational knowledge systems together within drawings, Stucke appropriates from visual taxonomies to create conversations between local knowledge systems of the human body and scientific classification structures.

## Biography

Amber Stucke was born in Chicago Heights, Illinois, in 1980. She has been living and working as an artist in Berkeley, California since 2004. She received her MFA from the California College of the Arts in San Francisco and has also had additional studies at Goldsmith's College in London and The School of the Art Institute of Chicago. Primarily working within the mediums of painting and drawing, Stucke connects the strong detail in her work to ideas within artistic research as-well-

as to dialogues between art and science. Her work is project based and involves interdisciplinary investigations within artistic production. Her work was exhibited at the *Drawing in the University Today: International Meeting on Drawing, Image & Research* symposium in Portugal, and her thesis titled *Embodying Symbiosis: A Philosophy of Mind in Drawing*, is published in an international academic journal called *Consciousness, Literature and the Arts*, based in the UK.

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## Introduction: Symbiosis State

On rawguru.com, you can buy, for thirty-four dollars and ninety-five cents, a tincture of cordyceps mushroom extract. The listing is stated as follows:

Organic liquid extract concentrate of mycelium. The pure healing force of the mushroom lies in its mycelium. Mycelia are the delicate life threads growing unseen in rainforest soil and wood, culturing organic matter and delivering probiotic nutrients to all trees and plants. It has maximum healing benefits on our physiologies. It is easy to digest and is rich in potent micronutrients. It contains Glycoproteins, Arabinoxylanes, Ergosterols and Broad Spectrum Glucans.

At least 1,500 years ago, Tibetan herders observed that yaks would eat Cordyceps and then frolic with great energy and "passion." This encouraged the herders to experience the power of Cordyceps, which has led to its use by hundreds of millions of people over the ages. In 1993, the Chinese National Track and Field Team attributed their success in breaking three World Records in part to their use of Cordyceps.

New Chapter LifeShield™ Mushrooms deliver the profoundly healing traditional mushrooms in their organic mycelial form, easiest to digest and richest in potent micronutrients. They are the supreme expression of mushrooms' protective and healing intelligence and are rich in polysaccharides and B-Glucans. The extract can be consumed directly or mixed into your favorite beverage. Naturally gluten free.

I have taken this mushroom extract every now and then to explore its uses in body vitality. As I take it each time, I think of the story of how the fungus is created, or in some sense evolves. The mushroom is usually found in a warm, wet tropical climate such as the Amazon Rainforest of South America or the Borneo Rainforest of Brunei, Indonesia, and Malaysia. The mushroom is found covering all types of dead jungle insects such as caterpillars, ants, and moths. Once the ant, or insect, comes in contact with the fungus on the floor of the jungle, the spores attach themselves to the external surface of the ant, where they germinate and infect the ant's brain. Disoriented and infected by the cordyceps, the ant steers away from the rest of the other colony of ants and climbs on a plant to reach higher ground. The ant clamps its mandibles down on the leaf or stem of the plant to secure its final resting place. The fungus then devours the ant's brain, killing its host. With the ant dead, it becomes a host body for the cordyceps to fruit from the brain of the ant. The mushroom's intention in using the host to locate to higher ground can be seen as to cover more terrain in spreading the fungus' spores to evolve its species.

This story takes me back to the cordyceps tincture extract. Under the marketing advertisement description to sell the tincture, it mentions the "mushroom's protective and healing intelligence." I can't help but

imagine to myself what the mushroom is doing inside my body while I take it. If it can be understood that fungus has intentions, it can also be understood that fungus has a consciousness. So, by ingesting this mushroom, I wonder how much influence the intelligence of the mushroom has over my body. Cordyceps can be seen as having a parasitic relationship with the host it encounters, but it can also be seen as having a symbiotic relationship with its environment. Fungus, in general, is known for its properties to break down organic matter and rejuvenate soil. Overall, I believe it is considered a healthy and necessary relationship even if it does kill other organisms for reproduction. From having the knowledge of this type of fungus, my awareness of its intelligence brings me to believe a possibility of having more power over me than I even recognize or understand. If biologically everything that I ingest is having a relationship to my physical body then how aware am I of my own intentions and myself in the world?

With this question, I am opening up the possibility that by ingesting a mushroom extract into my body, it might actually be influencing how and why I am making drawings with fungus in them in the first place. What if my art practice is more than just about graphite on paper or philosophical intentions? What if other consciousnesses from other organisms biologically influence how I communicate imagery through drawings from my body? This is similar to the same kind of question that writer Michael Pollan was getting at in his book, *The Botany of Desire: A Plant's-eye View of the World*. Pollan makes a strong case as to how plants have changed us to help them evolve in the world. He stresses how plants become so compelling, useful, and tasty to human beings that they (the plants) inspired us to seed, transport, extol, and do other important agricultural work to advance their evolutionary path. Pollan's notions of these broader complex reciprocal relationships between the human and natural world intersects with ideas of symbiosis where nature and culture interconnect into a coevolutionary relationship. He explains this concept further:

Evolution doesn't depend on will or intention to work; it is, almost by definition, an unconscious, unwilled process. All it requires are beings compelled, as all plants and animals are, to make more of themselves by whatever means trial and error present. Sometimes an adaptive trait is so clever it appears purposeful: the ant that "cultivates" its own gardens of edible fungus, for instance, or the pitcher plant that "convinces" a fly it's a piece of rotting meat. But such traits are clever only in retrospect. Design in nature is but a concatenation of accidents, culled by natural selection until the result is so beautiful or effective as to seem a miracle of purpose (Pollan 2001: xxi).

Pollan is only one source out of many that propose some clarification of motive to other consciousness beyond my own, whether it be through writing a book or in making a piece of art. Other experts include people such as Terence McKenna, Jeremy Narby, or Donna J. Haraway, who also continue a dialogue on awareness of other intelligence beyond human beings. Each of their research has brought and still brings insight and new conversations on either trans-species communication or plant consciousness. As an artist with curiosity and imagination to explore, I am drawn to investigate how my body experiences and learns from the world around me through drawing. It is curiosity that begins my journey of mind and body (mind-body). This curiosity also leads me to a journey of how my consciousness and drawing have grown together to create an internal state of mind that I call symbiosis state.

In my work, the act of creation begins with both an idea and a mark on a surface. Although the hand creates the mark that speaks the idea, it is the structure, or the rendering, of the mark that engages the viewer to explore, investigate, and decode the space between subject and object. This is the in-between space that I am interested in creating systems of known and unknown, visible and invisible, rational and irrational, philosophical and biological within drawings. I want to provoke a phenomenological space within the mind-body and guide the observer to connect to the separations and interconnections that I have created in forms to allow the viewer to imagine the possibilities and probabilities along with me. It is within this dynamic layout of unclassified forms that I analyze and organize the world around me to gain knowledge through drawing structures and relationships as well as to share consciousness. The drawings become a place for discovery and a guided tour into a state of mind, which can become a place to become other consciousness and also a place to learn of being and origins. This is the space where I embody symbiosis.

When I emphasize this in-between space as a place to also become other consciousness, I seek to change this space to eliminate any binary concerns of subject and object. Both subject and object, mind and body, observer and object, rational and experiential systems, human and non-human forms (all organisms), beautiful and grotesque all become one. This in-between space is then the medium (an agency) that binds and creates the transference and formations to create art. The medium becomes the glue for my own symbiotic relationship with graphite and paper; it also becomes the catalyst to travel to a land of other consciousness beyond my own.

Symbiosis, interspecific associations that play a significant role in the

evolution of humans, plants, animals, and in shaping of the earth's physical features, originates from a culmination of personal experiences, memories, and awareness that I believe are retained within my physical body (Ahmadjian and Paracer 2000: 13). Consciousness is embedded in the entire human body, not just one part. It is because of my belief in how I recognize the mind and body as one and not separate entities, which associates me with a philosophy of mind. From my body, from my hand, I connect to and communicate ideas relating to interconnections between all organisms. I create new relationships and new knowledge systems that explore and analyze the potentialities of the idea of symbiosis. It is not only through the act of drawing that I interact with these ideas and relate them back to the human body in visual art, but it is within these drawings and also within this essay that I bridge the image of contemporary knowledge systems today, back to the image of knowledge structures during The Age of Enlightenment. After each drawing has been created, it becomes a document and also an experience, which is intended to integrate both the image of the rational scientific and experiential knowledge system.

Out of appropriations from visual scientific taxonomies to biological structures of the human anatomy, my interests of systemizations allow me to sustain a conversation between a knowledge structure and an experience. The structure, or system, can define or create exactitude to an image. However, a system can also transform the familiar image out of the finite and into an encounter of symbiosis. To form a symbiotic relationship, to capture a phenomenological experience is also to document a sense of the unknown. It is this unknown territory, or in-between space, that makes up symbiosis: consciousness, drawing, and the vessel.

#### **Consciousness**

I regularly encounter a man at the tollbooth as I drive across the Bay Bridge. I remember only his face, his hand that gives me my change, and his facial hair that slightly covers a large tumor, or a bulge, growing just beneath his ear. I do not think of this man's identity or his daily struggles, but I wonder about a possible parasite that is biologically lodged within his body that has created this tumor.

I imagine and transfer myself to become this parasite, which has transformed skin, flesh, blood, tissue, cells, and the form of a body. I also imagine how to transform myself to understand this place of change and a land of other consciousness beyond mine. This image grows in my mind and connects to a chain that links to a symbiotic exchange. It

is the volume of the body, the tones in the skin, the texture of the hair, and the edges of the form that create a perception of consciousness. It is this awareness and curiosity of an unknown territory of biological physicality that creates an exploration of mind-body.

Consciousness is a vessel for sensation and perception to experience the environment and to gain knowledge. With consciousness embedded in the body, also known as embodiment, the idea of symbiosis is already a part of a learned knowledge system. Philosophers, cognitive scientists and artificial intelligence researchers study embodied cognition under the belief that the nature of the human mind is largely determined by the human body. Neuroscientist Francisco Varela has written extensively on this subject through his phrase of embodied action. Embodied highlights how cognition depends upon the types of experience that come from having a body with various sensorimotor capacities. And second, these individual sensorimotor capacities are embedded in a broadly encompassing biological and psychological context. Action is a word to emphasize how the sensory and motor processes, perception and action, are fundamentally inseparable in lived cognition (Varela, Thompson, and Rosch 1991: 172-173). It is through my embodiment of symbiosis that defines my physical body as a device to gain knowledge from my lived experiences. This experiential knowledge from consciousness is connected to the ideas within phenomenology.

In his book *Phenomenology of Perception*, Maurice Merleau-Ponty explains how human beings become aware of their bodies for the first time to understand what is true of all perceived things: that the perception of space and the perception of the thing, the spatiality of the thing and its being as a thing are not two distinct problems. The experience of the body teaches people to realize space as rooted in existence. He states how intellectualism clearly sees that the motif of the thing and the motif of space are interwoven, but reduces the former to the latter. He further deduces how the experience discloses beneath objective space, in which the body eventually finds its place, a primitive spatiality of which experience is merely the outer covering and which merges with the body's very being (Merleau-Ponty 1962: 148-149). Within Merleau-Ponty's discussion of the human body, he shows us that the body is not an 'object' in the sense given to this term by objective thought. Its properties are not determinate; its activities defy the empiricist attempt to provide causal explanations which depend upon scientifically testable claims about external relationships. It is through the body's acquisition and exercise of motor skills, such as using a typewriter, playing a musical instrument, or even creating a work of art, which, for Merleau-Ponty, gives a proper account of knowledge, understanding and intentional-

ity experienced within the physical body (Gurwitsch 1974: 162-163). Merleau-Ponty's phenomenology can give meaning to how my body holds memories, experiences, and awareness within my explorations of symbiosis. But if I break down and clarify all of my personal memories, experiences and awareness to an observer, then this in-between space becomes lost. My reasoning would desolve this unknown territory of exploration and creative experience to document, become, and share other consciousness within drawings.

The language that I speak of, and the text that I write in this essay, become part of this disruption and disconnection to the unexplainable—the unspeakable as well. Therefore, metaphor and theory bridge certain understandings—it gives and creates new knowledge of thought—but a philosophy of mind is not actual experience. It can give insight and reflection into practice, but it is the individual body's behavior and interactions that determine experiential interrelationships. Merleau-Ponty furthers this viewpoint; he shows how both science and phenomenology explicated our concrete, embodied existence in a manner that is always after the fact. Phenomenology attempts to grasp the immediacy of our unreflective experience and tries to give voice to it in conscious reflection. But by being a theoretical activity before and after the fact, it does not recapture the richness of experience. It can only be a discourse about that experience (Varela, Thompson, and Rosch 1991: 19). If phenomenology can help me theorize the body in my art practice, it is this practice, the act of creation within art making, which defines how I have come to explore a type of unknown territory and also a philosophy of mind. The act of drawing, the connection from hand to paper gives me self-consciousness. I become aware of my body, graphite, paper, light, the environment around me, and my internal thoughts. As I continue to draw, my conscious experience transforms to a space of consciousness of other (a space where subject becomes object and object becomes subject). This experience becomes trans-special where both human and non-human species coexist.

I not only believe that consciousness is biologically connected to my entire body, but I also believe in other consciousness all around me. All forms of life that I am looking at to investigate the idea of symbiosis, which includes fungus, lichen, algae and parasites, have a consciousness that can be explored, experienced, and translated. Other consciousness is a part of this unknown territory that I speak of, a place of transformation in energy where molecules and matter exchange and interact beyond the naked eye of visual perception. My self-consciousness instigates my awareness of other beings outside of my body. I see other consciousness of other organisms as cultures yet to be explored. Cultures that are

not defined by my Western education, Catholic, Caucasian upbringing, beyond my physical body, instead they are cultures of all forms of life—human, animal, insect, fish, plant, fungus, bacteria, etc. These types of cultures are also determined by behaviors and interactions for means of survival and evolution. All organisms, including human beings, relate on simple notions to evolve, associate, and communicate, but I consider these notions of other consciousness as in-between space as well, an unknown territory. I look to Elizabeth Grosz in pushing these ideas further to describe the act of creation as a form of trans-special communication, which crosses boundaries between self and other consciousness.

Grosz, in her book *Chaos, Territory, Art*, clarifies this understanding of subject/object-self/other interrelationships through an analogy to art. Grosz is not an artist herself, but interprets an experience of art from the words of the French philosopher Gilles Deleuze. She begins with how art is about sensation through a material experience. Grosz translates how the material becomes consciousness through the act of creation. Everything the artist uses for his or her means to express this consciousness melts into one another, where boundaries of subjects and objects no longer exist. It is art alone that can open up an in-between space to be explored and investigated. She further explains the importance of this field along with its future intentions.

The arts, each in its own way, are not just the construction of pure and simple sensations but the synthesis of other, prior sensations into new ones, the coagulation, recirculation, and transformation of other sensations summoned up from the plane of composition—indeed becoming itself may be understood as the coming together of at least two sensations, the movement of transformation that each elicits in the other. Art is this 11 process of compounding or composing, not a pure creation from nothing, but the act of extracting from the materiality of forces, sensations, or powers of affecting life, that is, becomings, that have not existed before and may summon up and generate future sensations, new becomings (Grosz 2008: 75).

As an artist, I identify with this experience of art. When I create a drawing, I also create a synergy between my consciousness (mind and body), the paper, and matter that exist all around me. This matter is alive and fuses the matter that makes up my body as well as any objects that make up the environment. It is within this in-between space where knowledge, experiences, memories, and awareness exist. It is where art has a place to remind us of others and ourselves in the world, and a place to share this consciousness.

The human imagination is just as powerful as a destructive hurricane, the force of a devastating earthquake, or even a fierce tsunami. For



French philosopher Gaston Bachelard, the true voyage of the imagination is the journey to the very domain of the imaginary. In the realm of the imagination, every immanence takes on a transcendence. The infinite is the realm in which creativity is affirmed as pure imagination, in which it is free and alone, vanquished and victorious, proud and trembling. There the images take flight and are lost, they rise and crash into their very elevation. The imagination becomes a psychic forerunner which projects its being (Bachelard 1971: 22–23). Imagination can and does transform consciousness everyday. It is its own agency within consciousness, sensation and perception, and matter. It is also a tool to gain knowledge of the world and to make sense of it. It is with my imagination I begin to draw.

#### *Drawing*

As the rainy season begins in Northern California, I become more aware again of the lichen in my environment; how it sits on top of my neighbor's fence, how it straddles parts of the stairway to my apartment, or clings on the rocks in the forest preserves that I frequent. The invisible lichen during the dry season become visible during the wet season. What seems dead or dormant, out of sight, comes alive and conscious in my mind. The droplets of water awaken the lichen's color, form, and shape—they speak to me; calling to me to listen to them. Enamored by their presence, I begin to imagine what the lichen is trying to communicate to me.

In biology, lichen is the purest form of a symbiotic relationship. It is a new species created from the marriage between fungus and algae. Lichens grow practically everywhere—on and within rocks, on soil and tree bark, on almost any animate or inanimate object. They have been found on the shells of tortoises in the Galapagos Islands, on large beetles in New Guinea, and in the dry valleys of Antarctica. Known as perfect bioindicators in the environment, lichens sensitivity to atmospheric pollutants such as sulfur dioxide, ozone, and fluorides has made them valuable indicators of pollution in cities and industrial regions (Ahmadjian and Paracer 2000: 112).

Lichens cannot exist without the rock, the branch, the fence, or the wood stairway. It forms a relationship with the present object, just as fungus, algae and parasites do. I imagine these objects as vessels to learn of the interrelationships formed between the lichen, fungus, algae and parasites. I want to become the vessel and the symbiotic organisms that organize together to understand, imagine, and explore the behaviors of symbiosis. To become is embodiment; it is to embody all

knowledge, sensation, experience, and memory through consciousness. To draw is to research this consciousness; it becomes both poetic and scientific. Under symbiosis, I imagine my own interrelationship by creating an open-ended idea of a vessel form. I do not imagine it as an inanimate object, but a living organism—a body of nature. I not only want to become the organisms that I create, but I want to make them come alive—to have energy and electricity to communicate this unknown territory without words. I begin with the vessel form. I draw its individual contour. I place the skin and then the hair—its form is dead until it creates a type of relationship with another living body. As I choose an organism such as cup fungus or red algae to form a connection with the vessel, the relationship can only be established afterwards in terms of logic if it is parasitic, mutualistic, or commensalistic. It is here the electricity comes through my hand to form new relationships and new knowledge systems, because I have no vision or plan of how the form should be created until I choose all of its parts. It is the graphite that becomes the conductor for the electricity to take place on the paper, between the paper and me, and between the paper and the viewer.

Graphite's properties of carbon layers are known to conduct electricity because of its vast electron delocalization within them. The electricity occurs when the electrons move freely within the plane of layers. It is the movement of the electrons that engage the surface of the paper that enables a dynamic symbiotic relationship to present itself. The symbiosis between the paper, the graphite, and me grows slowly in-between the blank spaces like mycelium under the earth feeding on the plant's roots and also becoming a part of its roots—transforming the root system to an evolved dynamic root that is both plant and fungus. This metamorphosis is also a transformation of the mind. It evolves an internal state of mind of becoming symbiotic relationships (symbiosis state). To become the represented living body of nature, I become the behaviors of the slime mold, crust lichen, internal parasites, or yellow algae to form a symbiotic relationship with each individual vessel that I imagine and create through graphite. I travel to this unknown territory as I draw through tone, line, form, volume, color, and expression. Somehow, everything connects and translates beyond my own act of creation—beyond my philosophy of mind. It travels to that plane where all planes coexist.

Just as Deleuze and Guattari would explain this idea of becoming, that coexistence is why planes may sometimes separate and sometimes join together—this is true for both the best and the worst. They have in common the restoration of transcendence and illusion but also the relentless struggle against transcendence and illusion; and each also

has its particular way of doing both one and the other (Deleuze and Guattari 1991: 59). It is here in this unknown territory of coexistence where I want to become, or embody, the idea of symbiosis to experience and remind myself of knowledge that is not language or text. It is also the place where I want to translate and communicate the sensations, experiences, and perceptions of my consciousness to others to share my knowledge of symbiosis beyond words. This kind of drawing practice is where intensities proliferate, where forces are expressed for their own sake, where sensation lives and experiments, where the future is affectively and perceptually anticipated. The drawing process becomes where properties and qualities take on the task of representing the future. It is where consciousness sets out not only the possible becomings of a subject-in-process but also the possible becomings of peoples and universes to come. It is the possibility of the creation of new worlds, new knowledge systems, and new peoples to live and experience them (Grosz 2008: 78–79).

If art has the power to transform experience and perception in the minds of other people, then I believe this is where drawing can have a type of scientific method within artistic research. Drawings can be based solely on aesthetic formal qualities present in the image, but it is the intention that can reveal layers of intensity and move beyond just the image present on the surface. Research is connected to this intensity in art marking. It emphasizes the development of a method or system to explore or interpret information. This process of drawing for hours to achieve a state of mind of symbiosis—to become the behaviors of living organisms in the environment—is a systematic investigation to gain knowledge. The drawing process becomes a creative methodology to learn interconnection, to create new forms, and to learn new systems. Without a specific scientific method, it does not hold up against empirical research, but it can communicate aspects of unknown territory in the mind-body connection. It can open pathways for new understandings in consciousness studies and also allow for renewal of ideas in reflection and contemplation in human experience.

My Drawing Method Includes:

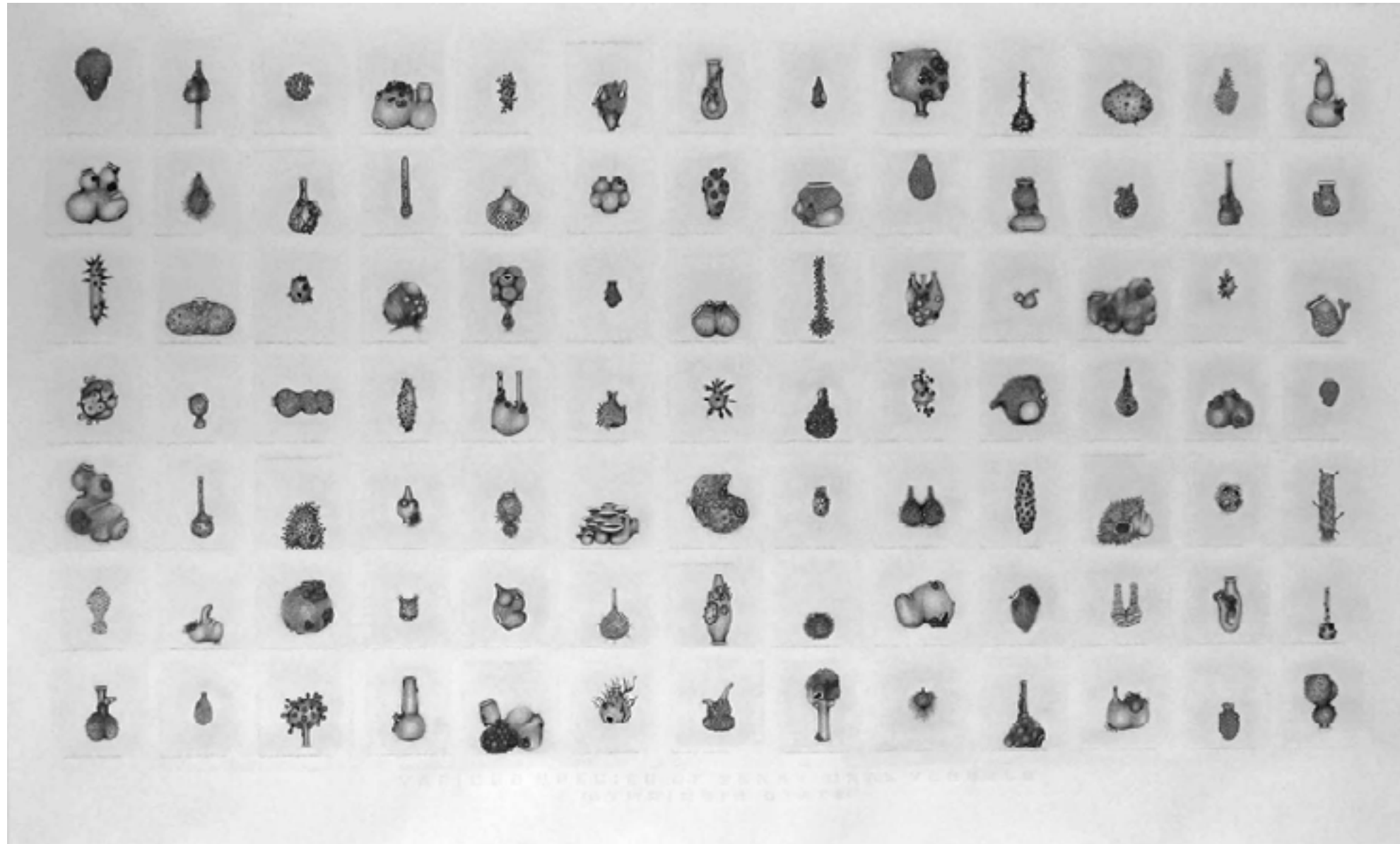
- Subject/object specifications
- Formal layout appropriations
- Vessel structures
- Mutualistic, parasitic, & commensalistic relationships
- Detailed, descriptive observations

- Imagination
- Open-ended texts

Just as described in evolutionary biology, it is only by nature that the human body wants to relate, communicate and evolve like all other species. I want to emphasize this knowledge through a drawing process within my investigations of symbiosis. The concept of symbiosis has been applied to human affairs in which cooperation and mutual aid have been the principal forces of evolutionary change. The importance of studying symbiosis in biology is underscored by the increased ability for scientists to control pathogenic organisms by understanding

the molecular mechanisms of biological interactions (Ahmadjian and Paracer 2000: 229). This knowledge in science is under-recognized and under utilized but can thrive in a philosophy of mind and in art. The relevance in having creative methods of documenting in-between spaces of subjects and objects allows for the human body to become the device for a local knowledge system to thrive. It is the systems that we create that influence the images in our mind to understand and

*Fig. 1 – Amber Stucke, Various Species of Behavioral Vessels (Symbiosis State), 50"x82"(h x w), 2010. Graphite, Ink & Gouache on Stonehenge Paper. First drawing in symbiosis state exploration. There are ninety-one smaller drawings within it.*



believe the classifications, taxonomies, topographies, encyclopedias, and dictionaries that have become the references of libraries. It is also the system that somehow motivates the drawing to exist and enables a relationship to occur. I take in this system with curiosity and sensitivity and explore how knowledge structures are only a vessel to learn of others and ourselves in the world.

#### *The Vessel*

During my young adulthood, I had a dream about my step-grandfather on my mother's side of the family. I was at his wake. He was placed in an open casket for viewing before the burial would take place. As I walked up to the casket, I knew it was him. I remember only the event of the funeral and not the emotion of the situation; I then woke up. He was alive at the time of this dream. Several months had passed, and then there was a phone call to my mom that my step-grandfather was placed in the hospital for treatment of emphysema. A month after he was placed in the hospital, he died. Yet again, I was at his funeral but this time it was not a dream. I never told my mother about this experience.

I perceive my physical body as a vessel and also a local knowledge system to share and to document within a drawing process. Its parts consist of flesh, bone, muscle, organs, blood, tissue, cells, and many other components that are known, but still unknown in many ways. I cannot explain the dream of my step-grandfather, for I was never close to him and hardly spent any time together with him. I think of how aware and unaware I am of my body, and how my bodily experience affects every aspect of my day and my life. It is within this body that I experience more than what is known as sensational, I experience more than what I can explain, more than what is considered rational. On the other hand, my human body has many rational, biological experiences and reminds me of my genetic makeup and just how physical and fragile my body remains as long as I am alive.

Arthritis has been passed down from generation to generation in my family. My grandmother had both osteoarthritis and rheumatoid arthritis. My mother, my aunts, and even my twin sister all have arthritis. I don't guess if I will ever have arthritis, I wonder when and what type I will get in the future. Today, as I wake up in the morning, I can feel stiffness and sometimes pain in my hands and wrists. These are signs and symptoms I need to watch and take care of, to remember what my physical, fragile body, this vessel, can endure.

Art allows me to create specific projects to research, investigate, explore and analyze through a creative process. Visual taxonomies created

during The Age of Enlightenment have attracted my eye aesthetically ever since I discovered them in antique stores in the town of Bath, England. Scientific illustration as we know it today originated during this time period. What once were cabinets of curiosities, also known as Wunderkammern, became organized and systemized into Linnaean classification systems within the field of taxonomy. Taxonomy is known as the science and practice of classification; it defines an empirical knowledge system used and updated within contemporary science. In my work, I appropriate from these visual taxonomies to create conversations between local knowledge systems of the human body and scientific classification structures. Both the rational and experiential come together to further an open-ended critique of what a knowledge structure is and what it can become. In taxonomy, the separation of parts to a whole and the displacement of form out of context all lead to visual engagement of learning and understanding of life around us. However, in my work, this type of education is juxtaposed with locality and autonomy from personal experience. It is because of this that the art becomes an open-ended idea, a vessel, for unique translation and a guided tour into a state of mind.

It is a hunger for life and a thirst for knowledge that always brings me to ask many questions. My curiosity and imagination are never empty and never quiet; they sustain a collection, a cabinet of memories, experiences, and awareness within my own mind-body. During Renaissance Europe, the cabinets of curiosities included artificial and natural, pagan and Christian, ordinary and exotic artifacts. The elaborate rooms of these strange collections demonstrated how we learn painstakingly by gathering and arranging bits and pieces in the dark. There is always more evidence, always another, and better, mode of organization for display. Stray specimens of cultural and natural remains—portraits of historical figures, trompe l'oeil still lifes, exotic animal species, scientific instruments, sports of nature, and marvels of metal casting—jostled one another on charged tables and cluttered walls. Instead of concealing the absence of connections, the dynamic layout summoned the observer to fill in the gaps (Stafford 1996: 34). The learning process for an individual is different for each person; it is subjective in nature to how one utilizes a system to gain knowledge. The gaps between the objects become just as important as in the placement of order. However, visual arbitrariness placed on cultural and biological collections associated with collectors such as Albertus Seba (a seventeenth century Dutch pharmacist and zoologist) only demanded more order and structure for the scientist to be born. It was out of the need for order and expansion of knowledge, where the empirical academic education system began

to create structures for learning systems.

In 1735, Carl Linnaeus (a Swedish physician, naturalist and explorer) created a rank based scientific classification system known as the Linnaean taxonomy. His system of genus and species remains the only extant classification system at present that upholds universal scientific acceptance. I am not so much as interested in using the actual structure of Linnaean taxonomy in my work as much as I am interested in using the visual format for separating relationships between living things to create new ones. The idea of separation is unique to rational and analytical knowledge systems. To take parts and place them in systematized arrangements allows for archives, catalogs, encyclopedias, and dictionaries to prevail. The critique of this education model is that it is an outdated system, which needs to be reunited back to the whole, or entire ecological structure, and within its context. On the other hand, the scientific mind is just as important in the use of separation as in the experience of body sensation. Together, they form a new knowledge system with open-ended intentions to both experience and education. This idea of educational, material sensationalism relates to The Age of Enlightenment pedagogical thought. During this time period, it was expected of the observer to explore unexamined intellectual documents of scientific illustrations to not only challenge people's insightful abilities but to also feed their visual curiosity (Stafford 1996: 190). It also correlates to the expansion of knowledge through interdisciplinary education, the invention of the print, an emphasis on humanity, and an understanding of reasoning versus faith-based thought. For instance, Genevan biologist Charles Bonnet depended upon a kind of material sensationalism within his education model in science during the 1700s. For him, learning was tied to the reproduction of images and the multiplication of motions in the sensorium. He reasoned how constant brain stimulation from observations of external impressions was essential to the generation of ideas (Stafford 1996: 187). Sensation and perception are intertwined into experiential knowledge gained from human bodily experience. Bonnet connected to people's bodily experience in learning situations; he knew that order and display needed more than just a system in place to attract visual imagery necessity. I too find that a familiar system can be utilized to share intellectual thought, biological experiences, and consciousness. It is the experiential knowledge system that brings me to look closer at the local knowledge structure.

Local knowledge generally refers to long-standing traditions and practices of certain regional, indigenous, or local communities. It can also be related to folk taxonomies, which are vernacular naming systems created from the way people make sense of and organize their natural

surroundings around them. Similarly, the human body has biological practices such as producing white blood cells on a day-to-day basis, or regulating heart rate, digestion, respiration rate, salivation, perspiration, urination and sexual arousal through the body's autonomic nervous system. From this perspective, the body too is always placed within a specific region or local community for some period of time. Consciousness reflects this placement and bodily experience within the consideration of a local knowledge system. The body has specific and individualistic experiences to a person's situation, environment, and human relations. The personal experiences become an act of autonomy, which make everything local.

Taxonomies originated out of folk biological classifications, which have been forgotten and displaced along side the knowledge systems of today. Scott Atran, an American/French anthropologist, validates this point, disputed among the scientific community. In his book *Cognitive Foundations of Natural History: Towards an Anthropology of Science*, he explains how:

The significance of folk ways of thinking about the living world to the development of systematics is not limited to the elaboration of those cognitive susceptibilities that helped to shape the *scala naturae*, namely, concern with a visible order of things and a focus on man as the standard of comparison. A more direct influence of folkbiology on science, and one whose effects have lasted to the present day, pertains to a basic common-sense disposition to apprehend and order discontinuity in the living world. The very notion of an absolutely ranked taxonomy sprouts from conceptual schema that are at the root of the layman's belief in a natural hierarchy of groups within groups (Atran 1993: 253).

Atran speaks of the experiential and common sense, everyday lived world knowledge, which has no natural hierarchical system. The structure is placed within the interrelationships of all organisms and not by the pyramid format. My investigation of symbiosis explores this local knowledge system inside of me. It is how I have come to create the idea of the vessel in my work.

In my drawings, I create the imaginary vessel as an open-ended idea connected to my explorations in embodying symbiosis. I invented it to form new relationships and new knowledge systems to be experienced. Its origins stem from a need for a visual structure to learn of other consciousness and myself in the world. The vessel acts as a living foundation for a symbiotic growth to occur. It is a structure related to the human body and also to a body of nature; it is alive and animate. It is also a structure of becoming known and unknown possibilities in

relationships as a means of describing our evolutionary biology. The vessel exists in this unknown territory; it interconnects both nature and culture.

**Conclusion: Philosophy of Mind & The Artist**

The northwest coast region of California is home to the world's tallest trees: the redwoods. Some of these living trees have been alive for over two thousand years. I visit these impressive redwoods at least once or twice a year to remind myself of how little knowledge that my body can hold within my lifetime. It reminds me of the length of time a physical human body can actually exist.

To this day, it is documented that the oldest person in the world lived to the age of one hundred and twenty-two. It appears to be a long time for a human body, but it is a very short life compared to two thousand years. When you stand next to an old growth redwood tree, the experience is beyond you. At a height of over three hundred and fifty feet tall with a base as giant as a small cottage house, I am in awe of its presence. I am reminded of just how small I am in the universe. I think of how one of these redwoods has lived before the collapse of Egyptian culture, through battles and wars, hurricanes and floods, agriculture, capitalism and the Internet. It becomes a vessel that marks the test of time and encompasses a knowledge system indescribable to my own. Even if I feel disconnected by my thoughts of this tree, I know somewhere, somehow inside myself that it's biology relates to my DNA. This relation crosses paths and time dimensions in a plane of coexistence and into unknown territory.

My philosophy of mind in drawing is how I embody the idea of symbiosis. I utilize this philosophy to encapsulate how I explore and investigate the nature of mind by looking at consciousness and its relationship to the physical body through a creative drawing process. My work connects to a philosophy of mind because of my belief in how I recognize the mind and body as one and not separate entities. This philosophy can also translate to a state of mind that is determined by specific perceptions and patterns of behaviors. I have come to decipher this state in looking at symbiosis as symbiosis state. It is a state that motivates my drawing method, my learning process, and curiosity of the unknown, which can harness experience and information. Autonomy used by the artist embraces these understandings. This perception of free will and self-governance understood within autonomy can drive a vision to create a shared experience.

As the artist, I have presented a space to explore interconnections between consciousness, evolutionary biology, philosophy and the imagination. I have opened new possibilities and probabilities in how to look at and think about something in plain sight. I also hope to have brought the observer closer to think about his or her own bodily experience in their everyday life, along with creative formats for research and investigation. By exploring knowledge systems of consciousness through art, I believe humans can open up new pathways for education and also renew ideas within reflection and contemplation in human experience. Nonetheless, there are questions towards my art practice that ask what really makes my drawings considered art, or furthermore, what makes my drawings considered scientific documents to learn knowledge from? Where is my work placed within interdisciplinary thinking in the art and science world? It is because of the specialization of established institutions of knowledge where this topic is divided between discourses. Artwork cannot be considered as a valid knowledge system to an empirical academic institution, because they have not created a system to recognize it along side already established structures. In any case, because I proclaim my drawings as documents of local knowledge from the human body, the work becomes a creation of art, which is established from the autonomous ideas held by the artist. So, if my work can be considered a work of art, I then ask myself if my work can also then be seen as a tool for alternative education? This question connects to ideas placed within artistic research, which cross disciplines to open critical dialogues and utilize visual intentions for educational purposes. Maybe the Italians seem to be ahead of me on my thinking.

In December 2010, NABA (Nuova Accademia di Belle Arti Milano—one of Italy's largest private academies) launched a project titled "Learning Machines. Art Education and the Production of Alternative Knowledge." The project consisted of a symposium, an exhibition, a temporary library, and a publication, which opened up a discussion on the relationship between art and education, between institutional and non-institutional practices. NABA was the first private art Academy in Italy founded by artists in order to oppose the rigid structure of the official Academy. Its intentions are to integrate education, research and production to foster a cross-disciplinary, intercultural and socially responsible approach to education and artistic production. This project and type of academy answers some of my questions that could possibly give a foundation to my current work, but I am also curious to understand how this project has relevance in the American art education system.

To bring you back to ideas in consciousness, I ask you to think about mycelium (thread-like branches connected to fungus). In a Michigan forest, there is a fungus that is considered to be one of the largest and oldest living organisms on planet earth. The underground mycelium of this fungus stretches for thirty acres, weighs more than ten tons, and is estimated to be fifteen hundred years old (Ahmadjian & Paracer 2000: 89). A fungus this successful and versatile goes beyond evolutionary biology; it has a mind of its own. The consciousness of this fungus might just become our future bio-Internet system. Mycologist Paul Stamets articulates this point of view of a possible and probable new knowledge system from mycelial networks. He professes:

...that mycelium operates at a level of complexity that exceeds the computational powers of our most advanced supercomputers. I see the mycelium as the Earth's natural Internet, a consciousness with which we might be able to communicate. Through cross-species interfacing, we may one day exchange information with these sentient cellular networks. Because these externalized neurological nets sense any impression upon them, from footsteps to falling tree branches, they could relay enormous amounts of data regarding the movements of all organisms through the landscape. A new bioneering science could be born, dedicated to programming myconeurological networks to monitor and respond to threats to environments. Mycelial webs could be used as information platforms for mycoengineered ecosystems (Stamets 2005: 8).

If Stamets can lay out new possibilities to understand the information around us, why can't artists raise the bar in thinking about new formats for learning as well?

I think back to the tincture of cordyceps fungus or even to the mycelium growing in Michigan. Why is it that humans feel the need to claim that we think we know everything? Or, why is it so impossible to have unknowns placed all around us in our everyday lives? Primarily, most people do not think about fungus. Growing up in the Midwest, mushrooms are seen as non-nutritional, poisonous, strange, non-tasty, useless, grotesque forms in nature. Overlooked and misunderstood, fungi are still placed today in an unknown territory of knowledge. However, if we go back and spend some time with the Chinese National Track and Field Team who have taken cordyceps or even just hanging out in the Michigan forest where the mycelium lives in the vast underground, I am positive our bodies would pick up a different sensation from the environment around us or even a different relation to the other person's body next to us. It would allow for a phenomenological experience and also bring us closer to a symbiotic relationship. The bio-Internet could exist within this experience.

Just as much, art allows for many unknown territories. I relate this

understanding to the misguidance of my visual perception. I know that my human vision is limited to how I consider my reality. Technological devices have given us insights into what the human perception cannot perceive, but its detectors and sensors still cannot absorb the vast amount of information all around us. I place this perception back to our free will as human beings and to what we think we know and understand in the world we live in. How much free will do I really have as a human being and as an artist? Cognitive scientists seem to discuss this question, but where do critically creative people come in? In art, my autonomy blends back into subject and object integration. This in-between space, or unknown territory, becomes the symbiosis that allows for these questions and conversations to survive.

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# Wright | Exchanges between Medicine and Drawing Practice – an example of interdisciplinary dialogue

## Abstract

This study is an example of growing interdisciplinary STEAM (Science, Technology, Engineering, Arts and Mathematics) collaboration, which explores relationships between concepts, skills and processes across five disciplines. Using drawing as a basic tool of research, recording and data collecting I am exploring methods, as part of my PhD research, that supports key skills that are used in surgical practice and medical training.

## Outline of study

My initial observations of surgeons working in theatre noted not only their common use of drawing but also other drawing-like activities. Surgeons produce sketches, diagrams and plans with conventional drawing materials. They make the most of any surface support to produce visual notes to explain or physically prepare for an operation. During a procedure they draw, mark and annotate anatomy on paper drapes covering the prone patient and upon the skin surface. The surgeon at work uses a wide range of delicate marks, strokes and lines that have the appearance of drawing during a procedure, with tools that have different purposes and haptic feedback. For dental and maxillofacial surgeons, surgical instruments have different weights and functions.

These are used within small areas of the head, neck or tooth, working with many types of tissue that have subtle ranges of density or tactile quality. Dentists work on teeth and gums that may be occluded or seen as a mirror image. Maxillofacial surgeons also have to work around and behind structures to remove material where tools or tissue may obstruct their direct line of vision. These surgeons have to have particular fine motor skills and be able to handle a variety of tools confidently and creatively to ensure the best possible outcomes for their patients.

During the study I took part in surgical training using virtual and simulated tissue, and having made many drawings during operations across several specialties, I developed a range of practical drawing exercises. I selected one to be used in conjunction with existing dental training to establish whether there was a connection between drawing aptitude and achievements using the HapTEL virtual learning device focusing on a specific surgical skill. The work had drawing as a central activity, and related to areas of anatomy and surgical procedures familiar to head, neck and dental surgeons, and was closely linked to the existing practical dental curriculum at Kings College London Dental Institute.

With the cooperation of Professor Mark Woolford, Director of Education at Kings College and Emeritus Professor of Information Technology in Education, Margaret Cox, a cohort of 130 first year dental surgery students, were identified to take part in the study. They were asked to keep journals recording a three dimensional ceramic object. The students were encouraged to use conventional and non-conventional media to record observations and to investigate the shared haptic nature of drawing with links to specific tooth morphology. After collecting information from the drawing journals I collated data from the hapTEL virtual learning devices to analyse and compare fine motor performances and drawing skills.

## Context: Drawing used within current surgical practice

Drawing is a regular practise for rehearsal, preparation and record keeping for a variety of surgical procedures. Although digital records are created and held for each patient, paper records are still made as a valuable tool for explanation and training. Surgeons across all medical disciplines use drawing and drawing-like activities to prepare themselves ahead of any surgical procedures. Through drawing, complex layers of anatomy can be identified and strategies planned to reach, remove or repair areas of tissue.

An example of this can be seen in the work of consultant ophthalmologist at Moorfields Eye Hospital, London Mr Ananth Viswanathan, who

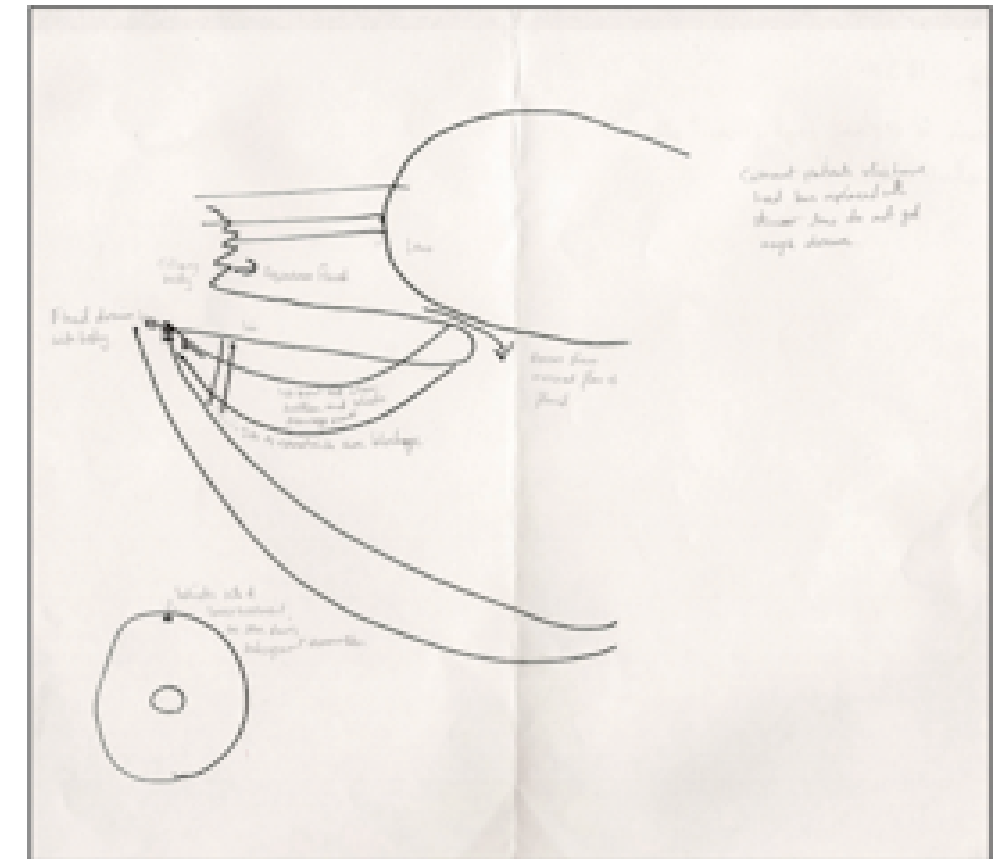


Fig. 01– pen drawing explaining ophthalmic procedure

uses drawings with students to map out structures.

After making the diagram of the basic structure of part of the eye Mr Viswanathan using his pen above the drawing to indicate through gesture the actual movements he expects to make with a scalpel or other surgical instruments, within the body of the eye.

Students at St Bartholemew’s Hospital, London also used a diagram to rehearse specific movements in preparation for an orthopedic operation. Using consultant surgeon, Mr Pramod Achan’s sketch of a damaged knee a fifth year student guided more junior students through the procedure they were about to observe. Pens and pencils were used as makeshift scalpels and needles, as the more experienced student demonstrated where main injection sites and initial incisions would be made on the knee. The work on paper was rotated and passed between the other students so they were better able to understand the orientation and anatomy they were going to observe in theatre.

Kang, Tversky and Black (2012) explain the importance of using diagrams to facilitate understanding.

“Diagrams have some advantages over gestures as a means of representing knowledge. Diagrams have permanence, so they can be inspected and re-inspected. Because they are external and persist, they do not need to be kept in mind, so the mind is free to use the diagram as a basis for reorganization, for inference, and for discovery. Diagrams use elements and spatial relations on a page to represent elements and relations that are actually spatial, as in maps or architectural plans, or that are metaphorically spatial, as in the periodic table or organization charts.”

#### Kang et al acknowledge that diagrams have difficulty in representing movement

“A series of gestures used to create a model of a situation requires working memory to create, understand, and remember, and can tax working memory. On the other hand, diagrams are static, so it can be challenging to convey action, change, and process in diagrams... In fact, when gestures are used with diagrams in explanations, diagrams are often used to convey structure, and gestures to portray action.”

Diagrams form an important part of record keeping in patients’ notes,

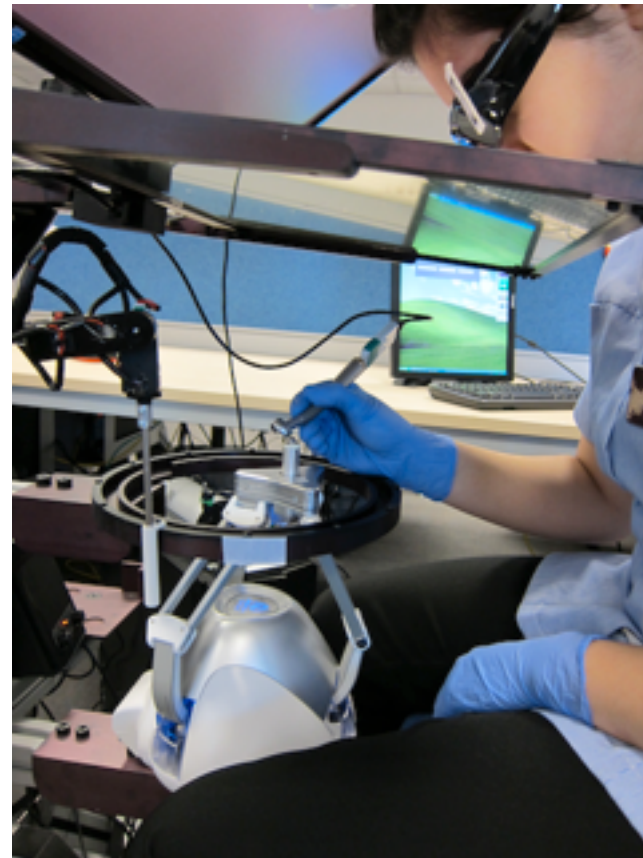


Fig. 02 hapTEL virtual learning unit at Kings College London, Dental Institute

but many of the diagrams I have observed being made by surgeons ahead of an operation for surgery appear to be being made more as a physical preparation or rehearsal for the fine mark making activity in theatre. In this case diagrams, for a surgeon would seem to have as much relevance to the physical preparation for surgery, linked to muscle memory or kinaesthesia as to working memory and spatial mapping.

During training novice dental surgeons are encouraged to consider the handling and movement of different tools and drills. Moves are rehearsed above a plastic head or virtual reality screen while students are taught the correct posture and positioning of tools before encountering live patients. Instrument use is discussed in conjunction with handwriting and drawing practice with the students by their tutors.

#### Drawing to support medical education

Fine motor skills and use of haptic, tactile and visual senses previously explored in maxillofacial and ophthalmic surgery are closely related to some of the procedures followed by dental students in their training. In the paper ‘Exhibiting understanding: The body in apprenticeship’ Hindmarsh J, Reynolds P, Dunne S, (2011), Hindmarsh et al observed students working with demonstrators – or tutors - and found that

“the student is not only given direction but is shown how that direction is reached through visual inspection and tactile exploration”

As demonstrators and students work together in clinic or lab Hindmarsh et al note that

“Part of the work in these training episodes is for the student to observe the body of the competent professional at work, so that they can shape their own bodily practices to that profession... the demonstrators’ assessment of student understanding rests on their own understanding of the body in action”.

Wulf G, Shea C & Lewthwaite R (2010) examined the literature around learning and performance and found that planned practical activities encouraged observation, developing ‘focus of attention skills’, and those that enabled group feedback and ‘self – directed’ practice, was important in raising levels of achievement. They found that

“observational practice can make unique and important contributions to learning, especially when observation is combined with physical practice.”

Taking this into account I began investigated ways of encouraging the use of drawing so that students would be able to work independently and

creatively and could be integrated into an existing training program. Feedback from MA drawing students at Wimbledon College UAL during a drawing workshop was useful in the planning and preparation for work with first year dental students. Several activities were trialled investigating how to raise haptic awareness through drawing a ceramic tooth like object, using conventional and non-conventional drawing materials.

From a variety of activities I was able to gather information from drawings made by the MA students about observation and interaction with the object together with appraising confident tool use. The students’ work was useful in the assessment of the development of physical dexterity, observation skills and creative use of drawing materials, whilst recording the tactile structure of the ceramic object.

Comments from drawing artists about the nature of the practical activities and drawing skills supported the development of criteria for judging the dental students’ drawing work. Further refinement of the criteria and scoring system followed discussion with Emeritus Professor Deanna Petherbridge. The resultant criterion applied to assess the outcomes from the dental students was divided into five sections and scored from 1 – 20. (See table 01 drawing criteria and scales overleaf)

#### Kings College Dental Students Drawing Activity

First year dental students were told that they were taking part in a cross disciplinary (STEAM) project that was intended to promote haptic and visual learning in order to enhance their technical skills. Each was given a ceramic tooth, (Fig. 03 overleaf) and an A5 (15 x 21 cms) sketchbook to record observations over a two-week period. They were asked to record the ceramic object in the journal that they had been given through drawing or other visual means. (E.g. annotated sketches, diagrams etc.) They were also encouraged to be as experimental and creative as possible, using different drawing materials that may have been unfamiliar as well as pens or pencils. The students were requested to investigate the object using different senses, e.g. touch alone, touch and sight etc. and record how and what they did in terms of physical investigation of the object. The journals were to be collected at the end of two weeks, when they were to be appraised along with practical work using the virtual learning workstations in the HapTEL lab.

After the two-week period I gathered 130 journals and analysed each against a drawing criteria to find the general levels of competency in the cohort. The qualities of drawing included the use of line, tone, and the drawing response related to tactile nature of object or materials.

Table 01 (right) drawing criteria and scales

Fig. 03 (below) ceramic tooth



Table 1 drawing criteria and scales

**1. Use of tone / light and shade**

Little / no use of tone	Some blocks of tone used on a few drawn images, used mainly to delineate basic shapes	Some shading used on drawn images attempting to show three dimensional nature of object on parts of drawn image	A variety of blocks of tone and areas of shading showing an awareness of three dimensional shapes many drawn images	Highly sophisticated use of tone on a majority of drawn images. Some images annotated to indicate understanding of why tone was used in different areas
1	2-5	6-10	11-14	15-20

**2. Use of line**

Simple lines expressing basic outline shape. Lines largely the same weight	Lines expressing more than outline. Some changes in the weight and direction of lines used to show shape and some detail.	A variety of lines used to extend understanding of three dimensional shape of object or specific details	Refined use of lines used to record fine details on many drawn images.	Complex use of lines on a majority of drawn images. Lines used to record very fine details of texture or structures.
1	2-5	6-10	11-14	15-20

**3. Mark making skills**

Unsophisticated / simple marks	Marks showing some degree of care and thought to record basic shape A few showing changes in size and weight in some drawn images	A variety of mark making used to record details some areas of interest or details of texture	Refined mark making combining different lines / weight / colour. Indicating changes in surface texture Some marks used in in experimental ways	Sophisticated mark making on a majority of drawn images. Highly experimental using different media
1	2-5	6-10	11-14	15-20

**4. Accurate record of three-dimensional shape and scale**

Little or no attempt to record three dimensions. Drawings show awareness of general tooth shape. Images scaled up in response to drawing materials little reference to adding details rather than to accurate recording	Some attempt to record three dimensions on a few images Drawings record one or two side views  Images scaled up to show some simple details	Drawings show an awareness of three-dimensional shape. Some images show correct perspective details root or occlusal surface structure  A few images scaled up to aid understanding of three dimensions and details	Most drawn images show side and occlusal surface with high degrees of accuracy.  Many images scaled up in order to make a more accurate recording of particular details (e.g. caries, complex root structure)	Drawings show object from different viewpoints. Side, occlusal and root surfaces recorded with high degrees of accuracy. Drawings or other images may be annotated with reference to solid structure. Some images scaled up and annotated in order to make highly detailed records of particular areas
1	2-5	6-10	11-14	15-20

**5. Use of drawing materials**

One drawing media used throughout journal	2 – 3 conventional drawing materials used throughout journal. Individual materials used separately for most drawings.	2 – 3 conventional drawing materials used throughout journal with some drawings using a combination of conventional materials to record details	Conventional materials used in combination with a variety of experimental, nonconventional two dimensional drawing materials	Conventional materials used in combination with a variety of experimental, nonconventional drawing material and different surface supports. May include drawing into or with three dimensional or solid materials
1	2-5	6-10	11-14	15-20



The journals were also evaluated for the levels of skills recording three dimensions or awareness of solid shape, and the creative use of drawing and non drawing materials. For each of five drawing areas I scored the degree of competence. I found students with high degrees of skill in recording and analysing the tooth structure using varied conventional and nonconventional drawing methods. Many students took on board the idea that the journal should include records of creative and experimental work, and some set themselves tasks to record the object in digital, three dimensional and mixed media as well as noting something of the haptic nature of drawing.

**Comparison with Virtual Learning Device (hapTEL)**

At the same time of gathering information from the students’ journals I also collected data from the hapTEL units about their skills in using a dental drill. HapTEL is a virtual learning system used at Kings College London Dental Institute with students at different stages of their training. The system is designed to enhance learners’ 3D perception, develop skillful tool manipulation, and relate these concepts to prepare a 3D virtual tooth cavity. Students and tutors are able to evaluate performance through computer readouts that show how well they have removed amounts of decayed material (caries) without damaging large amounts of healthy tooth tissue (enamel and dentine), or without going into the tooth nerve (the pulp material). Evaluation of confident tool use is made by looking at the length of time each session took, together with pauses in activity, which are also recorded on the system.

Each first year student practised removing caries from an increasingly difficult virtual cavity. I chose to focus on assignments towards the end of their first practical session – that is on the more complex tasks designated as cavity four and five. By this time the students were more confident using the virtual learning tool and familiar using the three dimensional aspect of the virtual jaw and teeth, and with the weight and handling of the drill.

Initial examples were identified as being interesting purely from the hapTEL data read outs. There appeared to be examples showing a correlation between students who produced competent and well-crafted drawings, with a strong performance using the hapTEL system.

An analysis of Student H115’s performance using the hapTEL unit in Table 02 show that over 74% of the caries (tooth decay) was removed and the pulp (nerve tissue) was not exposed. She took time observing the tooth, taking 24 seconds before she touched the tooth and took just over 80 seconds in total drilling. Looking at her journal her drawings

were accurate and clear, producing a series of drawings with strong lines simplifying the tooth shape to a basic outline. The student appeared open to using materials in a creative, but controlled way, as can be seen



in the toothpaste drawing, (Student H115 Fig. 4 (left) – toothpaste drawing) and was happy to embrace and use new technology to make a graphic representation of the object, as in the iPhone drawing. (Student H115 Fig. 5 (below) – iPhone drawing]

Student H026 appeared to have drilled straight into the pulp cavity in the caries 5 activity. The caries 4 log seen in table 03 showed slightly more caries removed than student H115, but pulp (nerve

tissue) was also exposed and removed. This student was much more swift in getting the drill on to the tooth surface, and spent a lot more time drilling in total. For the initial drawing activity the student chose not to record as an image but made written notes, one of the very few students who chose to do so. [Student H026 Figure 13 written description]. His drawings in the bulk of his journal use lots of rapid angular marks. The drawing of the tooth structure in figure 14 indicates speed and lack



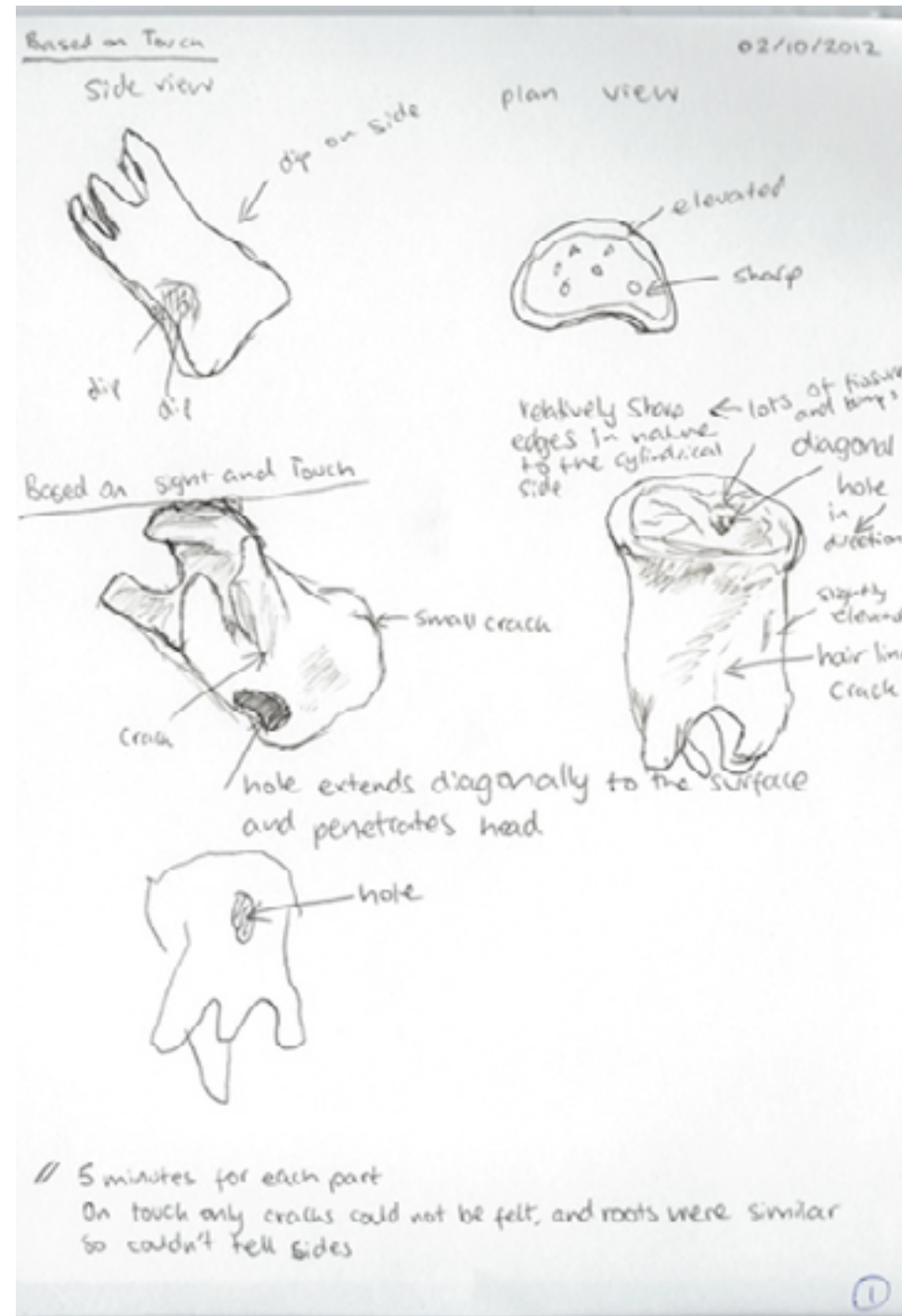
of fine motor control. The image is a roughly made sketch with metal staples crudely defining shapes. The choice of materials although in some ways a creative response are not used to give a feel of the texture or accurate idea of the shape of the tooth (Student H026 Fig. 6 (below) – pencil drawing with staples) Reading the images in the journal with the results from the HapTEL unit gives an impression of a student who wishes to engage in a task rapidly and lacks care and precision.

A student who combined note taking with systematic drawings of the tooth showed excellent fine motor skills using the HapTEL system. Although he did expose and remove pulp tissue he removed over 95% of the caries and did very little damage to enamel and dentine. (Table 04 overleaf) From the records it can be seen that he took time to view the tooth and position the drill. In his journal the student took the opportunity to observe, record and explore the ceramic tooth. He used a variety of marks, adjusting weight and tonal value to observed structure and texture. The written element adds to the comprehension of the haptic nature of the tooth as well as a thoughtful response to the given task. Developing skills in observing small details and responding are key elements in good surgical practice. (Student H114 Fig. 06 overleaf)



Students who scored highly on the drawing criteria (Table 01 overleaf) also on average performed well using hapTEL. That is those students who removed small amounts of enamel, dentine and pulp at the same time removing a larger percentage of caries showed higher levels of skill using the system and from these figures, students were perceived as being more adept by their dental tutors. The 9 top performing drawing

students – those who achieved total scores of 75 or above removed more caries and did less damage to the pulp than the 9 lowest performing students, both groups were able to remove similar amounts of enamel and dentine. (Table 05)



**Conclusion**

The study provides an example of cross-disciplinary work, where virtual learning tools were used in conjunction with drawing practice to produce data to analyse performance. It was felt that part of the success with the cohort of students was that they were able to make an open-ended, individual response, where the task was explained with an emphasis on the term recording rather than drawing.

The drawing activity was seen as a useful tool by dental tutors in supporting their training curriculum. Senior specialist clinical teacher at Kings College Dental Institute, Dr. Barry Quinn, felt that drawing practice supported the development of close observational skills and could be used as part of clinical training. He also felt that it could be used as part of an initial assessment of students' skills during the initial

interview process.

Future developments discussed with the HapTEL team and other computer scientists involved in the project have included possible ways to broaden the scope of the system to include other areas of surgery and medical training, particularly as this project has shown links to maxillofacial and ophthalmic surgery.

**Table 02**

Data Read Out from hapTEL unit

User Name: H115

Cavity=4

Material Logs

Enamel: Remaining 98.60%

Dentine: Remaining 99.00%

Carie: Removed 74.13%

Pulp exposed: No

Pulp: Removed 0%

Timing Logs

Total Duration: 143.25 seconds

Time at first contact: 24.00 seconds

Time spent Drilling: 80.24 seconds

**Table 03**

Data Read Out from hapTEL unit

User Name: H026

Cavity=4

Material Logs

Enamel: Remaining 97.15%

Dentine: Remaining 95.91%

Carie: Removed 80.57%

Pulp exposed: Yes

Pulp: Removed 15.23%

Timing Logs

Total Duration: 181.84 seconds

Time at first contact: 6.28057 seconds

Time spent Drilling: 169.40 seconds

**Table 04**

Data Read Out from hapTEL Unit

User Name: H114

Cavity=4

Material Logs

Enamel: Remaining 96.35%

Dentine: Remaining 95.24%

Carie: Removed 95.557%

Pulp exposed: Yes

Pulp: Removed 4.671%

Timing Logs

Total Duration: 521.961 seconds

Time at first contact: 32.4777 seconds

Time spent Drilling: 380.794 seconds

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