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Drawing skills, tracing and attention – towards drawing without hands

João dos Santos¹

msantos@ipleiria.pt

[Desenho/BD · Drawing/Comics]

Keywords

Observation drawing, tracing, attention, EEG, boundary objects, media art, digital technologies.

Abstract

Is there a drawing skill integrating a common ground for the perception of the things in the world? This is one possible question regarding an approach to the function of drawing today. There is no straight answer to this question because there is no univocal definition of drawing. Nonetheless, it is possible to delineate one important skill that is developed through the practice of drawing: attentive look. Attention, as addressed in these lines, is an educated perceptual skill that permeates the ability to see and to draw². I will argue for the value of traced drawings. I am assuming that the acquired knowledge and understanding of the visual field, integrating different parts in relation to each other and to the mind of the drawer, is this common ground; and that drawing as the mediation of this visual perception is the required skill. I will also suggest that attentive drawing can be measured and made visible using digital technologies, namely EEG interfaces, as an artistic undertaking.

01. Introduction

One of the most widespread biases towards drawing is that it is seen as an exclusively artistic discipline. This argument is grounded in historical facts, but above all it is a social and cultural construct based on the popular assumption of the artist as a descriptor of the world.

My argument is simple: today, in the advent of new forms of non-human intelligence, this is a too simplistic assumption, because everybody is increasingly becoming the “curator” and descriptor of their worlds; as in Neal Stephenson’s novel “Snow Crash”(1993)[1] or in William Gibson’s “Spook Country”[2] (2007), and almost everybody has the inner perception of being able to represent it by any available technological mediation, augmentation or generation system, with drawing being left out of this equation. Let me quote a paragraph from a 2009 EACEA report on artistic education in Belgium, as an illustrative example of the apparent fungibility³ of drawing:

1 LIDA – Design and Arts Research Lab, ESAD.CR, Politécnico de Leiria, Portugal

2 Drawing ability should be understood as being ontologically different from what is commonly called a drawing gift.

3 “Fungibility is exchangeability. Fungibility also means getting anatomized into exchangeable parts to be stored, shipped, sold, combined with other parts for a new product, or decomposed entirely for elimination. When parts are worth more than the whole, the living being ceases to exist as a meaningful unit. Fungibility means that “life” is reduced to just another state of matter, to plug and play into machines of re/production. Chickens grow like vines into cages; cattle are planted in boxes of mud where they are watered, fertilized, and fed growth serum. In modern animal industrial processes, the “livestock” are already in a state of living death.” [3]

“The use of ICT [Information and Communication Technologies] is felt to be important in the Flemish Community of Belgium, because it allows pupils who are good at coming up with ideas, yet not as good at drawing, for example, to use ICT to provide them with alternative ways of realizing their ideas.” [4]

Two main thoughts surface from these lines, one is the contextualization of drawing as an artistic, or difficult, issue and the other is the understanding of drawing as a tool for the consensual representation of given models. I believe that this description of drawing (in the education curricula context) is antithetical, since it locks ideas into a pre-existent and culturally produced plethora of possible forms without considering the fact that the mind of the drawer also translates into the drawing and that there is always a perceptive common ground, allowing thoughts to become a perceptible form.

Another bias regarding drawing today is embedded in our visual minds, and can be summarized in the following Hoffman and Richards paragraph:

“Clearly your visual system is equipped to describe the shape of an object and to guess what the object is from the outline. This guess may just be a first guess, perhaps best thought of as a first index into a memory of shapes, and might not be exactly correct; it may simply narrow the potential matches and trigger visual computations designed to narrow them further.” [5]

The drawer’s mind is permanently scanning, constructing, and reconfiguring reality to keep it stable and accessible, and this processing effort tends to substitute actual vision during a drawing process; unless the drawer is a skilled drawer, acknowledging that memories will try to impose their will upon the light received on the retina. To draw is also an enquiring upon a subjective inner vision: “... observation drawing constitutes a way to deconstruct the collective representations and figures that each subject receives from his culture while contributing to deepen his own subjective process of reconfiguring the world.” [6]

Observation drawing is a way of training the ability to relate the visual actuality with the visual mind – it is an attentive process; and traced drawings, as suggested in section 4, are a powerful way of exercising the visual mind towards attention.

Along this text I will approach the use of drawing machines, borrowed from the sciences and arts, as seeing and drawing machines used for the discovery of the things in the world and for its interpretation as a contextual construction. Since those are tracing machines, I will argue that tracing can be a form of inquiring upon our perceptive biases while acknowledging the creation of a subjective visual world as integrated in a common ground of interrelated marks.

This article proposes a reflection on drawing and attention, and the use of digital technologies as a way for enhancing its significance. Proposing an artistic experiment of the drawer’s attention during a drawing action, following Siegfried Zielinski reasoning on what a laboratory can be in the context of media art:

“In this sense, one can speak of artistic experiment. Thus, one can refer to a studio with mainly technical equipment and a focus as a laboratory. In a laboratory, research, development, and tests are undertaken; results are discarded or gained. Such work is connected with a peculiarity of artistic praxis, which it shares with science and industry. The difference is that it possesses far greater significance for art.; indeed, for some it is the very essence of art: intuition, the very specific way of looking. It is inextricably linked with the most important source of energy for artistic praxis, namely, the imagination.” [7]

02. Why drawing (today)?

Is there any purpose on drawing that we can't find anywhere else?

I believe that the simple answer for that question is yes, and no. But this is the simple answer to the question of a special purpose on drawing, and we'll get there after sketching an answer to the first question – the difficult one.

“There is no way to make a drawing – there is only drawing.’ Richard Serra remarked in a well know interview. ‘Anything you can project as expressive in terms of drawing – ideas, emotions, language structures – results from the act of doing.’ Simply put, for Serra and for many artists of his generation, ‘Drawing is a verb.’” [8]

I believe that drawing is a very powerful learning and thinking tool – not only in the arts.

Drawing means putting into context: when we throw the dice, we are making evident the game context in which the action occurs; curiously, when we draw the dice throw, we are approaching different contexts, because the drawing of the action of throwing the dice carries with it the game of chance, or the potential of such an image. While the throwing of the dice is inscribed in a juridical instance (the context is closed by a set of rules that dictate the range of possible actions), the drawing of the dice throw is one of the potentially infinite representations of that action. The limit of the number of possible drawings is dictated by the set of rules that one's visual system uses to recognise a certain arrangement of lines and shadows in the construction of the image/drawing, and by the allowances of the body.

For lay observers, drawing is a game of chance, but for the drawer it is a process, the sketching of an idea, a project, or the feeding of a loop system in which the drawer draws waiting for the drawing's feedback to continue the drawing. Drawing can be (and this is my approach to a definition of drawing) a never-ending inquiring upon reality – drawing frames, reframes, contextualizes, connects, and re-contextualizes: mixing, juxtaposing, translating, identifying, and pointing to reality. Drawing creates a trans-contextual⁴ relation with the real.

We can therefore also conclude that drawing is the means by which thoughts take form in front of the eyes, and also that drawing is a powerful tool for change⁵; with at least one peril: its trans-contextual character can produce errors; but we can afford this peril if we take it as way to produce

⁴ “Beuys' drawings became eloquent scripts for reuniting elements that modern life had divided: the primitive and the modern, art and science, private thought and public action.” [9]

⁵ Richard Serra calls drawing «a verb», a thinking-to-action-to-thinking tool. [10]

awareness, or self-awareness – drawing reveals our biases⁶ and forces us to cope with the misjudgements they tend to create.

There is no definite answer to the question «Why Drawing?», because if drawing is related to context, we can also presume that it is a genuinely disruptive but useless tool. Anyway, I take for granted that its unusefulness is only apparent, because if we draw to complicate things, we can draw to make things clearer – and this is the realm of design and engineering, and physics, and chemistry, and biology, and architecture, and communications, and economics, and ... the arts – and its transdisciplinarity. It is an incredible system, with a huge elasticity⁷, and mandatory in contemporaneity.

Aaron Kozbelt is a psychologist and professor with an interest in creativity and cognition, and in learning to draw as a way of learning to see, as well as its implications for artists and non-artists in the realm of visual recognition: “How are visual artists cognitively different from other people?”. In one experiment, he compared artists with non-artists on the performance of a series of drawing tasks:

“The results of the present study suggest that in drawing and perceiving, art students use visual cognitive procedures that are qualitatively similar to those used by non-artists. Thus, artists’ perceptual advantage derives at least partly from their greater proficiency in using these procedures rather than from acquiring different kinds of procedures.” [13]

Kozbelt outlines a possible approach to the question “why draw?”: drawing is to perceive and learn about the world, and this can be achieved by developing our cognitive skills. In a complex and hyper-connected world like ours, drawing becomes a simple and accessible way to develop perceptual/trans-contextual and communicational⁸ skills (some common examples are: diagrams, storytelling, visual summaries,..).

03. Becoming proficient

Visual cognition, as described so far, requires a kind of drawing proficiency (and disposition), which is not exclusive to skilled artists or drawers. In the current context, a skilled drawer should be understood as someone who practices drawing with the aim of being proficient⁹, and therefore someone who can take advantage of a different approach to the visual cognitive process.

The acquisition of drawing skills doesn’t necessarily rely on one specific kind of training or in a set of prescriptive tutorials devised as the

6 “Systematic errors are known as biases, and they recur predictably in particular circumstances.” [11]

7 Paula Antonelli describes elasticity as follows: “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.” [12]

8 Susan Leigh Star and James R. Griesemer, address this issue when coming to terms and finding a common ground in the context of the different actors participating in the building and functioning of natural museums: The coherence of sets of translations depends on the extent to which entrepreneurial efforts from multiple worlds can coexist, whatever the nature of the processes which produce them. (...) There is, therefore, an indeterminate number of coherent sets of translations. The problem for all the actors in a network, including scientific entrepreneurs, is to (temporarily) reduce their local uncertainty without risking a loss of cooperation from allies. [14]

9 “(...) when Cennino Cennini advised students: ‘Do not fail, as you go on, to draw something every day, for no matter how little it is it will be well worth while, and do you a world of good.’ [15]

method to achieve expertise in drawing. Drawing, as Almeida, and Fava¹⁰ claim, is not (only) a matter of exact representation, it is about inscribing oneself in the present, it is about knowledge and training attention, and using it to explore and navigate the myriad of layers of the real. And this kind of proficiency it is not achievable without constant practice:

“The acquisition of expertise in complex tasks such as high-level chess, professional basketball, or firefighting is intricate and slow because expertise in a domain is not a single skill but rather a large collection of miniskills.” [17]

Kahneman’s words can be translated to the field of drawing as his argument can be applied to the teaching and learning of drawing at all school levels. Drawing should be understood as a transversal skill to be developed by each student according to their curricula, in an incremental and trans-contextual process. It should not be understood solely in an artistic context, or as falling under the category of visual arts, as is currently the case in most European schools, regardless of educational levels.

Also, the basic conditions for the acquisition of any skill are:

“- an environment that is sufficiently regular to be predictable; and - an opportunity to learn these regularities through prolonged practice.” [18]

This looks like the description of a proper learning environment, at least until the age of sixteen.

If all school curricula contemplated the learning and practice of drawing as a trans-contextual acquisition of skills aimed at the development of attention, it would certainly be understood as a powerful cognitive tool, with collateral results such as a better understanding of biases for the construction of common ground, a renewed notion of the expression “being in a connected world”, and the meaning of the verb to draw.

Attentional strategies¹¹ are closely related to the acquisition and development of drawing skills. Drawing practice is a way of practicing a kind of putting the outside «into brackets», like the noise-cancelation system in some headphones.

Drawing isn’t necessarily a permanent attentional activity; the drawer’s attention might drift out of the visual spotlight¹². By practice and repetition, we can improve our ability to ignore external noise and disci-

10 “I would like to propose that the distinction between evaluative and attentional strategies can be useful when considering how to facilitate learning. Drawing facilitates the development of meta-cognitive control in these domains. We can think of drawing instruction “as a training in thinking” (Archer 2011) and can be mindful of a space in which many approaches and conventions for drawing exist. Students can be encouraged to navigate their own strategies for “thinking through drawing” that are appropriate for their own aims, rather than merely learning conventions such as the Coldstream method. In doing so, they can gain awareness and control of cognitive strategies which are widely transferable.” [16] (Fava, M. 2012)

11 Kevin Passino, points to fact that attention is affected by sensory stimuli and by the control functions overseen by attentional activities: “Hence, learning can play a key role in how our attentional dynamics operate.” [19] (Passino, K. M. 2005, pp. 266-267). In the case of observation drawing, the drawer will develop attentional strategies to avoid external stimulus interruption during his observation/drawing act.

12 “In the context of vision, it is useful to think of our focus of attention as a type of “spotlight.” This spotlight may coincide with where our eyes are focused (“overt” attention) or it may be that our eyes are focused at one point, and we attend to (shine our attentional spotlight) a different point (“covert” attention).” [20]

pline our stimulus-driven attention reorientation. Drawing is a life-long learning process. Can we measure the drift and make its effects visible on the drawing? Brain Computer Interface (BCI) Electroencephalogram (EEG) technologies can measure and collect signals that can be returned as drawn animated information, adding new layers of meaning to the act of drawing.

04. The role of copy drawing with tracing paper in the construction of the drawing skills

“Founded on the judgment of the eye (*giudizio dell’occhio*), freehand drawing presupposes ideas of originality and authenticity, whereas the practice of tracing inhabits a minor place in the margins of drawing’s history and is usually perceived as deficient in originality.” [21]

Drawing mediated by other means than the eye of the drawer, the hand holding the pencil and the surface where the drawing reveals itself, is culturally perceived as a lesser form of drawing. I propose that this consideration is based on a narrow definition of drawing, in which, for example, tracing is regarded as minor.

There is a long tradition of machines used to aid in the construction of drawing as a model image of its object. I will approach this tradition as a narrative about the nature of an inquiring gaze and the role of vision in the discovery and interpretation of the world and its things.

Alberti, Leonardo da Vinci, Dürer, Van Gogh and many other artists used perspective frames as mediators between a 3D world and their drawings.

Here, we will follow the path of Van Gogh’s drawing into a perspective frame, designed in his *Neuen sketchbook* [22] as a means of “acquiring a sense of spatial proportion”.

The perspective frame is a device used to translate the three-dimensional world to a frame, by means of a projection, where it will be perceived as a bi-dimensional image, ready to be copied to the drawing surface. The framing action creates an abstraction: the image thus created is a virtual image, frozen by the device and perceived as detached from its natural continuity.

One can sense the contiguity, if not the intersections, between art, science, and technology in the description of these devices. Although they were created by, and for, artists, they were used, and are still used, by scientists (an example of the application of this kind of framework is found in archaeological drawing) - they are devices used to describe, interpret, translate, and construct the world through the correlation of its parts.

Filippo Brunelleschi’s experiment (ca. 1415), conceived as a proof of the correctness of linear perspective, exemplifies the intersections between art and technology explored during the Renaissance. This demonstration serves the purpose of assigning a role to machine-mediated drawing that contextualises the visual experience in relation to the actuality of its subject.

“Hence the discovery of perspective in the fifteenth century, the upsurge in measuring instruments during the sixteenth century and the

rise of telescopes and microscopes in the seventeenth century are three interconnected developments. Perspective instruments did not simply affect painting practice: they extended the scope of optics, changed the criteria for veridical vision, transformed the very process of objectivity, and hence affected western science as much as art.” [23]

With the co-evolution of the techniques of representation applied to art as description of the real (or, as enhancer of the real) and to new visible worlds open to the explorations of Natural Philosophy, new machines of vision were created and developed in order to accompany this illustrative revolution.

Robert Hooke’s book, *Micrographia* (1665) [24] is exemplary at the intersections between science and art. In it, the natural philosopher searches for invisible minutiae in the things of the world with the help of drawing and a microscope. Robert Hooke asserts an active role for drawing, as an instrument of mediation between vision and the world of things, by describing the blade of a knife and the minute irregularities only noticed on its surface during the act of drawing¹³. His interest on the relations of drawing and vision devices is documented in the illustration of a portable Camera Obscura, conceived as a drawing machine.

Another drawing machine that is of interest to the present text is the Camera Lucida. William Hyde Wollaston wished to have the skill to draw the views observed during his walks. Assuming his unfitness for the art of drawing, he decided to create a machine that would facilitate “the means of transferring to paper the apparent relative positions of objects before me” and in 1806 he patented the Camera Lucida, whose “principal use (...) is to facilitate the delineation of objects in true perspective” [26].

The Camera Lucida becomes the instrument that allows, with ease and precision, the selection of the visual saliencies of the model/image that are relevant for the recognition of the object in the drawing.

Nowadays, besides the resurgence of the machine in a new form – the NeoLucida¹⁴; the Camera Lucida is used as an “add on” to microscopy.

The Camera Lucida is a tracing device that requires some drawing skills from its user in order to meet the accuracy requirements, as noted by Wollaston or any user of the device. Of interest from my point of view is that these drawing skills are acquired through repetitive use of the machine: the drawers can become skilled at drawing with the device (i.e. be able to achieve the representation goals) if they practice proficiency in its use (i.e. being able to level their representation goals with consciousness of their abilities as a mark makers).

Both, Camera Lucida and Camera Obscura, are machines for seeing and copying over that require of the drawer the ability to select the marks that become a trace on the surface of the drawing, and the knowledge that it is the interactions between all the traits that will give meaning to the drawing

13 A contemporary version of this description can be found in *Quicksilver*, the first volume of Neal Stephenson’s *Baroque Cycle* [25]

14 “The NeoLucida is a 19th-century optical drawing tool updated for the 21st century.” [27] Started as a kickstarter project by Golan Levin and Pablo Garcia.

as representing a model of the visual experience of the thing in the world¹⁵.

If, with the perspective frame, the translations occurred from a 3D world to a 2D virtual window and thence to the drawing, with these drawing machines the translation occurs between a 2D image projected (physically or virtually¹⁶) onto the drawing surface, where each perceived contour line has the potential to become meaningful as a part of a 2D drawing superimposed on the image. The drawing results in an ‘extrusion’ of the image below, and I believe it is this seemingly easy translation that is at the root of the label worthless drawing, connoted with tracing drawings. Through drawing, the drawer must know which marks to select to create a resemblance to the original image, and this knowledge is related to the drawing skills mentioned above - if the drawer does not select and only traces all the visible marks on the drawing paper, the result will be a camouflage, in which all the marks are equivalent and where it is not possible to create distinctions, or a context for these distinctions to occur.

It is the selection of the visible lines by the drawer to become the strokes in the drawing that will match the resulting drawing to the model.

I think the power of knowing the differences between seeing as a memory shortcut imposing itself on our visual mind and looking as an attentive experience of seeing is one of the greatest drawing skills one can acquire today.

05. Towards drawing without hands - experimenting with attention measurement, drawing and possible digital translations

To conclude, we will extend the space of this article into the domain of the experimental laboratory, using Siegfried Zielinski’s notion of chaos “to mean that dynamic linkage of multifarious elements of chance and necessity, which is by nature opaque and out of which arise phenomena and processes that we can understand.” [29]. Susan Leigh Star and James R. Griesemer’s notion of Boundary Objects¹⁷ helps me frame the description of a future experiment within this artistic laboratory.

In this section I lean towards future explorations of the intertwined relationship of learning to draw and learning to see attentively, as a process of translation between the drawer, an audience (e.g. school children), science, technology and art.

BCI-EEG is used in studies of attention. Commercially available and widely accepted as quasi-medical devices, BCI-EEG headsets provide the

15 Béla Julesz [28] (2006) tried to identify and describe the path of visual information through the brain, for the construction of images as we perceive them. This is a research work based on scientific data of the time, but also a speculative and creative work, where the author is seeking meanings for the works of a black box. In it we find explorations on the selection and suppression of parts, derived from partial interventions of attention. Too much specialisation results in the perceived object being meaningless - and a meaningless object cannot be a model.

16 In the case of the Camera Obscura, the image physically “touches” the drawing surface. In the Camera Lucida, the image is projected onto the eye and is virtually superimposed on the drawing surface.

17 Boundary objects are objects which are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured to common use, and become strongly structured in individual-site use. These objects may be abstract or concrete. They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognisable, a means of translation. The creation and management of boundary objects is a key process in developing and maintaining coherence across intersecting social worlds.” [30]

accuracy and ease of use for a new project dedicated to detecting attentional fluctuations during a traced drawing act.. Towards drawing without hands, proposes a collaborative drawing process looking for a playful way of exercising drawing towards proficiency, surpassing the cultural bias surrounding drawing by tracing, through the use of digital technologies collaboratively¹⁸.

Two media artworks serve as background to this exploratory endeavour: Nina Sobell's "Brain Wave Drawing" (1973) [32], Richard Ramchurn's brain controlled movie *The Moment*, "utilizes the participant's attention levels to alter the narrative of the movie" [33], and the project *Cosa Mentale* (2016), by Cristna Hoffmann, Gille de Bast, which "addresses the question of whether it is possible to draw with two brains connected to one hand. A mentalist, equipped with an EEG headset, stimulates two electrodes placed on a drawer's arm. By focusing, the mentalist sends an electrical impulse that makes the drawer lose partial control of their hand's movements." [34] Commercially available and widely accepted as quasi-medical devices, BCI-EEG headsets provide the accuracy and ease of use for a new project dedicated to detecting attentional fluctuations during a traced drawing act.

Towards drawing without hands can be described as a collaborative drawing, in which the drawer, using a pen on a digital tablet, traces over a given image. The results of this action are projected live on a screen and followed by the second performer whose attention to this action is being measured and translated as lines in dialogue with the tracing. Imagine a viewer watching the result of a roll throwing of the dice, and imagine the drawer drawing the result of the same action. This interaction between two drawers brings a new layer of meanings to the drawing and, simultaneously, turns it into a game where errors and mistakes are accepted as part of the attentive drawing process.

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¹⁸ "Integration of arts into BCI is referred to as artistic BCI (Andujar et al., 2015). (...) multiple users can participate in a collaborative game, in which joint decision making is required to control the gaming environment (Nijholt and Poel, 2016; Sekhavat, 2020)." [31]

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