

The edges of lighting design

Research and practice on the fringes

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Art and Science are often seen as two distinct areas of intellect and activity, with a continuous line between the two extremes that can map the location of other disciplines, such as design, that include various proportions of art and science (Maeda 2013).

In this linear representation the extremes represent what may be described as a Pure Art, an area concerned only with aesthetics, and a Pure Science, an area that eschews the aesthetic and concentrates on analysis and rational thought to produce an artless science.

However, whilst many areas of knowledge and practice, such as design or engineering, appear to fit neatly onto a line between art and science, there are exceptions that suggest that this model is incomplete. The examples of polymaths such as Leonardo Da Vinci (artist, inventor, engineer, scientist, mathematician and anatomist) seem to defy a single location on a linear scale. Leonardo was, at the same time, excelling at Renaissance art and science. The example of Leonardo appears to contort the linear art-science model such that the two extremes meet, not in the middle, but at the ends. Leonardo fuses high art and high science, skilfully using each one to advance the other. It is as if Leonardo managed to warp the line into a circle where high art and high science can exist in the same place.

“Artistic activity is a form of reasoning, in which perceiving and thinking are indivisibly intertwined.” (Arnheim 1997, p.V)

Gram (2010) sees the linear continuum between Art and Science as a flawed model. He references management theorist Henry Mintzberg to create a modified version of a Mintzberg model that includes Craft (or experience) as a third position in the model. Table 1 records Gram's definitions of the three loci.

	Science	Art	Craft
Foundation	Logic	Imagination	Experience
Relies on	Scientific Fact	Creative Insight	Practical Experience
Raison d'être	Replicability	Novelty	Utility
Decision Making	Deductive	Inductive	Iterative
Primary Strategy	Planning	Visioning	Try Something
Contribution	Science as systematic analysis, in the form of inputs and measurement	Art as comprehensive synthesis, in the form of insights and visions	Craft as dynamic learning in the form of actions, tests, trial and error

Table 1: Science, Art, Craft. Adapted from Gram (2010).

Gram (2010) also adapted a diagram by Mintzberg which mapped these three points as a triangle:

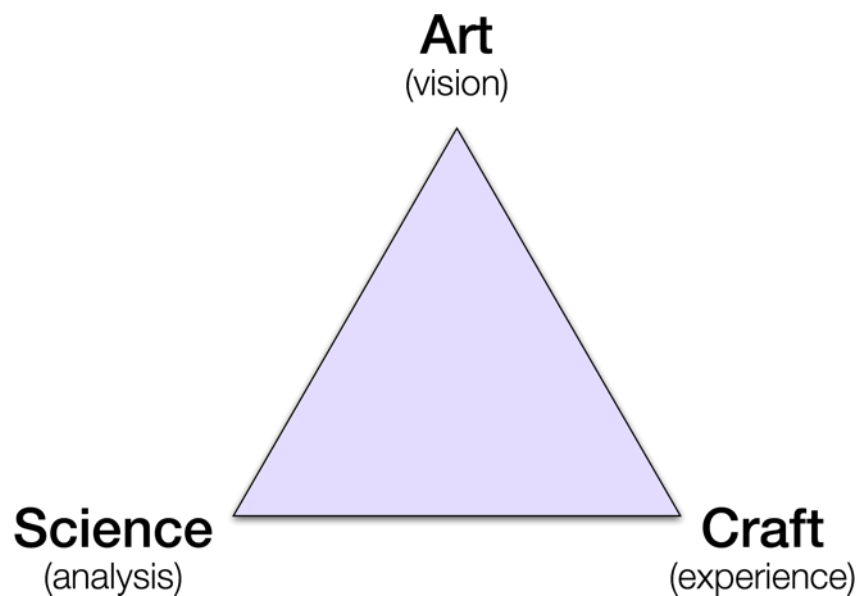


Figure1: Science, Art, Craft Map. Adapted from Gram (2010).

This tripartite model may also manage to include another common linear continuum, the one between aesthetic and functional. For, if we see Art as being the loci of aesthetics, then the pinnacle of Craft can be defined as the

point of total functionalism. Rather than a typical dictionary definition of Craft as a description of small scale and hands-on activity, in this model, Craft should be seen as a broader term that encompasses many experience-based fields. After all, if Craft is defined as a “profession that requires particular skills and knowledge” (Wikipedia), then that would encompass (to greater or lesser degrees) diverse areas such as: construction, engineering or nursing.

If we now reapply this tripartite model to Leonardo da Vinci, we see that all his many activity areas can be encompassed within this model. Nevertheless, the breadth of his interests and skills suggest that Leonardo cannot exist as a single point on this chart, but instead occupies an area, a non-geometric shape that covers the science, art and craft of his broad portfolio of work.



Studies of the foetus in the womb, Leonardo da Vinci

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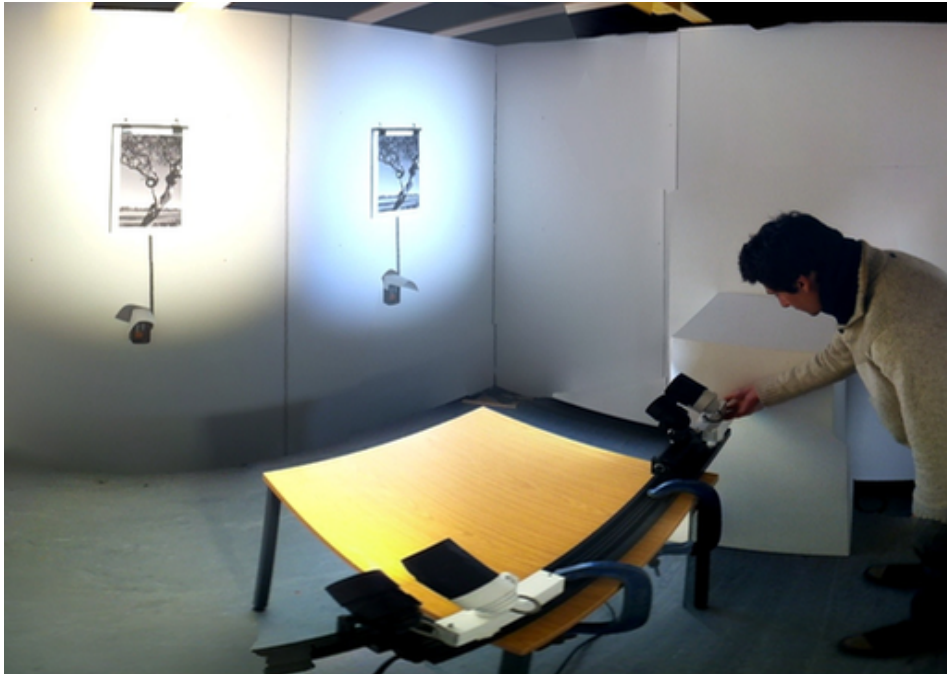
https://en.wikipedia.org/wiki/File:Leonardo_da_Vinci_-_Studies_of_the_foetus_in_the_womb.jpg

If we then begin to think of where Lighting Design may exist within this model, we begin to see that, like Leonardo, a single point cannot describe all of Lighting Design. Lighting practice extends from the almost purely aesthetic light art, to the more experience based craft of theatrical lighting and numerically based illumination engineering. In amongst this there are also areas with a strong scientific or analytical underpinning, such as light for health or conservation lighting in museums.

For me, some of the most interesting, exciting and inspiring aspects of lighting design exist on the margins, the extreme boundaries of what we might define as design. As I have not had any formal education in lighting design myself, a lot of my own lighting design practice has been built on a foundation of learning by emulating others, learning by doing and building up a store of experience - the Craft of Lighting. However, even when I was studying as an artist at Edinburgh College of Art, I was never satisfied with simply accepting received wisdom, I was always inquisitive enough to want to know not just that something was true, but why that was true. I found my own work to be stronger with this theoretical underpinning. This quest for deeper knowledge and deeper meanings is something that I believe is common to many established lighting designers that I know. Colin Ball of BDP in London talks often about lighting design through the lens of philosophers or psychologists such as Carl Jung (Ball & Kaleva 2011); Italian designer Francesco Iannone has created unique lighting schemes for Renaissance paintings by applying ideas of neuroaesthetics to his practice. (Iannone 2013) Emrah Baki Ulas of Steensen Varming has talked about ideas as diverse as lighting designs role in economics and consumerism (Ulas 2011), and esoteric ideas such as how light allows us to “taste with our eyes” (Ulas 2013).

The more I have learned about light, the more I have come to believe that good lighting design is good psychology. This is an important factor in lighting design because the empirical metrics that we have to work with (from the lumen to colour metrics) often fail to adequately describe the complex and contradictory nature of the human visual experience of light and colour. In this sense, human centric lighting design, as opposed to illumination engineering, is a form of applied or practical psychology. As designers the oddity here is that to fully satisfy the human response to light, we need to fall

back upon our experience (Craft) and our aesthetic feelings (Art) for light because the pure science does not always apply.



Perception of Brightness Experimental Set Up

An example of this is an experimental study that I set up to empirically explore a visual effect that I had experienced in lighting conservation displays in museums. I had seen in practice that adjacent museum displays lit to the same illuminance level can appear to have different apparent brightnesses depending on the colour temperature of the illuminant (Innes 2011). Whilst I am not a scientist, this study used scientific methodologies to explore a feature of light that I had experienced on site (Craft). Whilst on site, I saw that there was a clear discrepancy between the existing theory (that the illuminance measurements accurately represent human perception of light) and observable fact.

I was expecting that my experiments may show either a very small effect of brightness perception being influenced colour temperature, or possibly no effect because I had imagined the whole thing. However, I was surprised at the effect was very clear amongst the test subjects and was much larger than I had expected. This foray into using scientific methods to explore aspects of light, colour and perception has led me to look at other features of light that I

have experienced through my Craft. This has enriched my design work and has made me realise how valuable targeted experimental work can be to support the more intuitive aspects of lighting design.

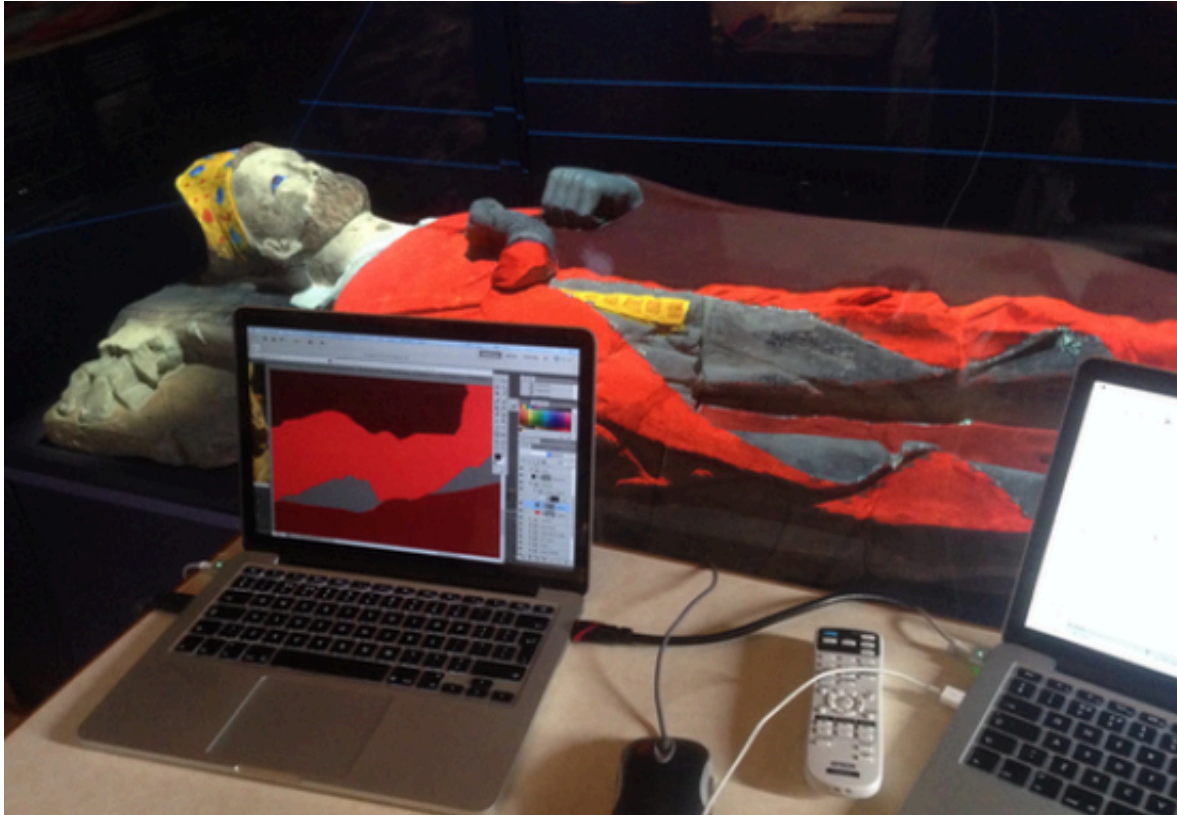


Botanic Lights Project. Photographer Grant Ritchie

Having originally trained as an artist before discovering lighting design, light art plays an important role in my own work. The majority of my work is design, but it is very difficult to identify where the boundary between my own art and design actually lies. My light art projects are always undertaken with a designer's approach to problem solving, my design work is equally informed by an artist's vision of the desired outcome and a strong rationale or narrative for the project. For me, the two disciplines are complimentary and strengthen each other.

A recently completed project at Elgin Cathedral combined aspects of Art, Craft and Science to illuminate a life size 13th century carved stone funeral effigy of Bishop Archibald. The effigy was originally brightly painted, but the subsequent 700 years have not been kind to the effigy and almost all of the paint finish has been lost. This research led project set out to virtually restore the lost colour to the object, using light. The project did call on existing skills

in museum and gallery lighting, projection skills from light art projects and elements of scientific understanding to determine how the exhibit would respond to projected colour.



Bishop Archibald Effigy, Elgin Cathedral

This kind of creative use of projection equipment raises important questions for designers. Firstly, is projection lighting design. Is a projector just another light source that we can work with? Should lighting designers be actively working with projection or should they leave projection to others? As projection systems continue to become smaller and more reliable, these questions are going to become harder to ignore. It is therefore important that we are asking these questions of ourselves now and begin taking charge of the illuminated future, before other specialists do.

Designers often suffer from an inability to explain what we do. As Steve Jobs, co-founder of Apple said, “When you ask creative people how they did something, they feel a little guilty because they didn't really do it, they just saw something” (Wolf 1996). But designers should not be so coy about the intuitive skills they possess or believe that, in some way, they are inferior to scientific intelligence. After all, Albert Einstein himself was a great admirer of creativity and intuitive thought:

"I believe in intuition and inspiration. Imagination is more important than knowledge. For knowledge is limited, whereas imagination embraces the entire world, stimulating progress, giving birth to evolution. It is, strictly speaking, a real factor in scientific research." (Einstein, cited in Demetrikpoulos & Percore, 2015, p.x)

It is possible that recognising effective lighting design as a creative combination of Art, Science and Craft could help help us to get over the embarrassment of being designers. Embracing life at the boundaries of lighting design can open our minds to new opportunities and strengthen and extend our core practice. It has enriched my work and I would recommend everyone to be more inquisitive and question the norms of lighting practice, after all, some of them are built on vary shaky scientific foundations.

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