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E A R L Y V I S U A L M E D I A L A B

C I C A N T

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**MEDIA ARCHAEOLOGY
EXPERIENCES:
METHOD, MEANING
AND AMUSEMENT**

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Abstract

In this paper I make four interventions in favour of the seductive value of experiential media archaeology. 1) The constellation of material artefacts that mediate between us and the world are an implicit context for historic writing on perception, representation and epistemology. Engagement with the materiality of these often-forgotten artefacts offers insight into the meanings of texts that exclusively text-based scholarship would otherwise miss. 2) Tacit, artisanal knowledge embedded in artefacts sometimes exceeds that which can be found in written texts. I argue that an effective way of accessing this material logic is to re-build old artefacts to see how they work. Applying the theory of extended cognition to this process, I make a case for its unique epistemological value. 3) I show how the seductive intimacy of these objects can be amplified by re-imagining their aesthetic possibilities. 4) I discuss the educational value of the “rational recreation” with media artifacts as “philosophical toys.”

Keywords: experimental media archaeology; media art history methodology; historical methodology; artisanal knowledge; thinking; rational recreation; extended cognition

Lost Artefactual Contexts for Reading Historical Texts

My aim in this essay is to describe some of my experiences building and interacting with old media and to reflect on the value of these experiences for understanding the history of perception and mediation for myself and my students. There is a growing academic interest in supplementing the mere reading of historical texts with physical engagement with material objects from the past – what Dupré et al. (2020, p. 15) call the “material turn”. I will be illustrating some of the ideas in this literature and adding some new ideas of my own. I begin with a *camera obscura* that can be built by sealing off all light from a room (or, in Latin, a *camera*) except a single pinhole open to the outside world. I converted my garden shed in this way into a device widely known and much discussed in the 17th and 18th centuries.

As soon as the room was dark and my eyes became accustomed to the dim light, I wondered for a moment whether I or the Enlightenment observers had been mistaken. I thought that light must be leaking around the edges of my cardboard shutter. When I tested this by putting my thumb over the pinhole aperture and removing it again, I realized that what I was seeing was the image. It was *everywhere*, on every surface including the ceiling; and where it projected on objects it cast shadows. The sun projected down near the back tyre of my old motorbike; the snow-covered ground outside projected on the ceiling. Angled surfaces stretched and distorted the familiar shapes of the things projected onto them. The display was so disorganised that it was hard at first to recognise it as an image, never mind an image with a coherent logic. Nothing

in the historic texts had prepared me for this. There were discussions of the strange inversion – left to right, top to bottom – but not of the panorama (an extreme wide angle close to 180°) nor of the anamorphoses (distortions). Why was there this silence in the texts?

Historic sources describe a perfect image, a jewel-like miniature of reality, projected on a screen. It was only when I held up a conventional projection screen, in this case, a rectangular whiteboard squared to the aperture, that I saw what they saw in the 18th century – a little painting rendered in linear perspective. Period writers also draw an equivalence between the screen of the *camera obscura* and the retina of the eye. Like them, I felt rather like a tiny explorer standing inside the human eye, looking at the retina and seeing for the first time how we see. It was not hard to imagine the eye itself as an apparatus, just in the way it was understood in the 18th century, and to wonder how accurately it depicted the external world to us through the medium of these little paintings projected on the inner screen.

Despite all the reading I had done on optical theory, this ordering of light on the white surface *did* seem to me, as it did to my 17th-century predecessors, to be a kind of demonstration or proof. Perhaps there actually *were* invisible rays of light travelling in unerring straight lines from each point of the objects outside towards the shed and through the tiny aperture in its masked window. Only those rays that intersect the $\frac{1}{4}$ inch hole (and since we are speaking abstractly now, let’s imagine it to be a point that lets in a single ray from each point on each object in the scene), only those are allowed to travel through and fan out in the shape of a cone to alight on all surfaces

of the room. Pure geometry must be at play to ensure that all the disparate rays can be organised with such apparent precision on the whiteboard. Geometrical certainty linking the world outside to the image within was at the heart of what Jonathan Crary (1990) calls the “epistemological figure” of the *camera obscura*. The order on the whiteboard fits that conceptual paradigm; the chaotic image that I initially perceived did not. I suspect that Enlightenment writers neglected to describe the chaos since it did not fit their theoretical hopes and expectations.

Engagement with concrete objects can reveal silences in historical texts. One reason for such silences is the paradigm blindness evident in the case of the *camera obscura*'s anomalies. People often fail to see or take note of, evidence that is inconsistent with their theoretical frameworks (Kuhn, 1970; Bantjes, 2014a). While in the 17th and 18th centuries many theoreticians ignored the anomalies of the *camera obscura* I believe that many artists did not. Their explorations are embedded in the artefacts they constructed – such as Van Hoogstraten's perspective boxes or the many wide-angle images on curved reflective surfaces inserted in Flemish paintings. These are examples of artisanal knowledge which appears in artefacts but not in texts – what Pamela H. Smith (2006) describes as an unwritten “artisanal literacy.” Historians of science are recognising the extent to which “natural philosophers” collaborated with artisans and instrument makers and learned from their practical knowledge (Roberts, 2007, pp. 4–6). While artisanal knowledge often exceeded that of theorists, it lacked authority, associated as it was with the social class position of those manual or “mechanical” workers who produced it. The people who made images for optical boxes

and the theatre adopted wide-angle techniques long before theorists of perspective recognised their existence or their validity. Only a careful analysis of the artefacts, *vues d'optique* (Fig. 1), can bring that to light (Bantjes, 2014b).

Experience using old media can also unlock meaning otherwise hidden within historic texts. Everyone knows in the 21st century what it means to tap, swipe and scroll on a digital device. We can use these words without elaboration because their full meaning is filled in by the taken-for-granted technological-perceptual context of the present. In the 20th century, in a different technological context, words like “swipe left” would be difficult to understand without hands-on experience with 21st-century devices. Similarly, Europeans in the second half of the 19th century were immersed in the 3D world of stereoscopy in a way that we no longer are. Stereoscopy brought attention to and occasioned discussion of anomalies of binocular vision and how they should be represented in painting. Many painters, including Cézanne, responded to this situation with innovations in how to represent space on the flat canvas (Bantjes, 2017). Without hands-on experience with stereoscopic devices and images we cannot fully understand the problems he was responding to or the visual solutions he pioneered. Treating his works as visual texts, we benefit by reviving the media context of his time in order to fully “read” their meanings. This applies to a wide range of historic texts. The media context of a particular time has tremendous importance for how people then understood their world. As historians we cannot fully understand that world without immersing ourselves, as far as we can, in that often vanished and forgotten media context. We can also apply these insights to the present and ask, as Marshall McLuhan (2002 [1964]) did



Fig. 1 Basset [publisher], *Vue de L'Hôtel du Lord Maire à Londres*, n.d. [late 18th century]. Copperplate engraving, 29.2 × 45.3 cm. Private Collection. By comparison with conventional perspective renderings of this scene as well as an old London map, I was able to demonstrate that this *vue d'optique* is a wide-angle view. Straight lines that would be curves in a wide-angle projection are rendered as straight here (Bantjes, 2014b).

about our emerging electronic media: how does our present media environment or “technological sensorium” shape and bias our understanding of our complex world?

I am particularly interested in shedding new light on past philosophical texts in this way. Philosophers writing about perception and epistemology appealed to media experiences of

their time to make abstract and difficult concepts concrete for their readers. Immanuel Kant assumes his audience will be familiar with 18th-century 3D projections – a magic lantern illusion where images are projected onto smoke and a concave mirror projection of a 3D image into pure space at a location that he calls the “focus imaginarius” (Andriopoulos, 2011) (Fig. 2). The force of these illusions, as experienced in

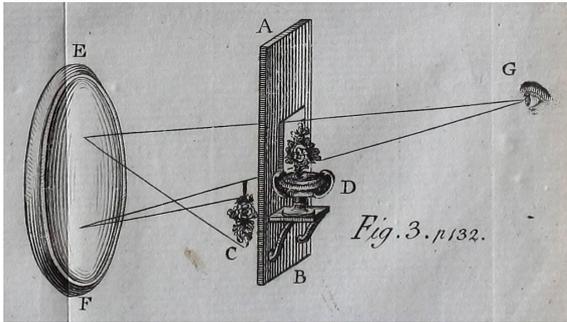


Fig. 2 Hooper, William. 1774. Plate XII, Fig. 3, "Real Apparition," in *Rational Recreations in Which the Principles of Numbers and Natural Philosophy Are Clearly and Copiously Elucidated*. London: L. Davis etc.

his time, was meant both to illustrate and to lend credibility to a provocative idea: that is, that our perception of space and volume is not a sensory input from the eyes, but rather a form imposed on sensation by the mind. We conjure space in perception rather like the showman with the magic lantern.

The media experiences of philosophers may also have helped them not only to express, but to formulate complex ideas about perception and understanding. Thomas Reid, in 1764, postulated a new geometry of perceptual space which is non-Euclidean. Cartesian space was based in rectilinear architecture where parallel lines are straight and never intersect. Reid, well in advance of the geometer Bernhard Riemann and the theorist of space curvature Albert Einstein, imagined a space where parallel lines curved in "great circles" and intersected at two points. Reid knew how to use a sextant and was familiar with celestial navigation at sea. Standing on a ship pitching and rolling in the open ocean with no visible



Fig. 3 Benjamin Martin, English, mid-18th-century, Orrery, brass, ivory and mahogany, Science Museum Group.

landmarks, no flat surfaces, the marine navigator must determine his/her place in space by the orbital motions of planets and stars in relation to a rotating spherical Earth bounded by imaginary lines of latitude (great circles). Non-Euclidean geometry would be easier to imagine for someone who could see the world mediated through celestial navigation rather than a Cartesian grid. The orrery (Fig. 3) was a physical device designed to help people grasp celestial navigation.

Reading about old media can never replace engaging our senses with it. That is partly because historic texts are often

silent on important aspects of the experience – either repressing them as in the case of the *camera obscura*, or not wasting effort by describing what at one time everybody could be expected to know already. Evidence of this is how people have responded when I have shown them old devices and how they work. They are amazed and delighted. This was true of seasoned academics in philosophy, art history and cognitive psychology to whom I showed the *camera obscura*. They should have known intellectually what the *camera obscura* did, but once inside the darkened chamber they all, like me, experienced the pleasure of discovery and wonder.

Extended Cognition: A Theory of Media Archaeology Experiments

People in several fields including history, anthropology, musicology, art history and media archaeology have recently been theorising about the value of this sensuous encounter with old media (Dupré et al., 2020; van den Oever & Fickers, 2019; Emerson, 2022). Why should something so practical and hands-on need theory? For one thing, it can add legitimacy to and thereby can bring audiences and resources to a kind of work that is unfamiliar and possibly suspect to those trained in purely text-based scholarship. Theory can strengthen the case that I have been making here, that engagement with the artefacts can unlock new kinds of evidence and can yield new knowledge of the past that escapes the texts. The seriousness of theory may also be a way of justifying, to ourselves and others, a guilty pleasure that perhaps has its roots in the infantile and erotic pleasures of touch (I do not mean this pejoratively). The researchers in media archaeology that I know all delight in their toys. They typically collect them or work with

them in public and private collections. They are drawn to them for their intrinsic charms – their beauty of finish, their quirky design and function, their forgotten artifices of delight. This love is in and of itself something to embrace. Love too has its methodological value. We live in a world of a thousand distractions, and if historical work is to be done at all, it helps to have seductive objects that draw us back to the past, calling us to bridge temporal distance and allow history to do its important work in the present.

Theorising can also raise fundamental questions that are important across all academic disciplines. Any science that touches upon human beings must grapple with the problem of how to account for agency (our ability to act freely and make choices) while acknowledging the often overwhelming ways in which the systems and structures of our world shape and direct our actions and sometimes themselves seem to exercise agency. Take for example how the language we use to describe the economic market acknowledges this possibility – we say for example, “the market decides...” or “the market reacted badly to the news ...” as though it had a mind and intentions of its own. There is a long tradition of granting agency to artefacts understood as part of technological complexes – when, for example, people argue that technologies change how people think or change society. Recent and projected advances in artificial intelligence make the agency of artefacts potentially more literal than metaphorical and correspondingly grave in consequence (Russell, 2019). In media archaeology the “Berlin school” has advanced a strong form of this idea that artefacts have agency – drawing in part from actor-network theory in the history and philosophy of science (Parikka, 2011).

A related question is the extent to which our technologies constitute us. We can think about this in terms of prostheses – such as glasses that enable some of us to see clearly or the mood-modifying drugs that so many of us rely upon to regulate our personalities. We can also think more broadly of something like a language as a human invention, a technology, that we all rely upon to mediate our social relations and our projections of our “selves” to others. Or consider McLuhan’s idea of the “technological sensorium” – that our technological media are actually extensions of our ability to perceive the world. Where is the dividing line between us and all the subtle and invisible machines that enable us to perform the capacities we associate with our “selves?”

I will intervene in this debate with insights from recent philosophical writing on “extended cognition.” Andy Clark (2003), who coined this term, argues that thinking does not take place exclusively within the mind or brain or the confines of the individual body. Consider something as simple as long division (Fig. 4). The paper, pen and symbolic inscriptions are artefacts external to us. They enable us to accomplish calculations that for most of us would be impossible to do “in our heads” – they extend the capacities of our minds. They are also material, public and open to scrutiny by all. “Expanded notation” represented here is new to me, but I recognise it instantly as a scaffolding that makes more visually concrete something that I have always done in old long division.

Artefacts not only help us think but are part of the structure of our thought. I am interested in interrogating media artefacts not only from the perspective of past media users, but also from the perspective of the makers of these objects – to

recover the tacit thinking that past artisans have embedded in these objects. To accomplish that, I have undertaken to build several objects myself. I resorted to building in part through necessity. Where I live in Nova Scotia, there are no collections of 18th- or 19th-century media objects nearby. So, if I wanted to interact with an 18th-century optical box, I had to make one. I am also interested in rare objects that exist only in description but with no known surviving examples – such as the Kantian mirror projection or optical boxes that use concave mirrors rather than lenses. One of the first things I learned is that period descriptions are often crude or inaccurate accounts of the thing itself. My main guiding principles, as with the artisans before me, had to be the material constraints of the real – the shapes and structures of components that have to be in place for the thing to work as intended.

Building without a detailed blueprint always involves tinkering – an art of tentative trial-and-error. I like Erkki Huhtamo’s (2011) term “thinkering” for this “thinking aloud” through material artefacts. Let me illustrate with my experience of building the Kantian mirror projection. The best description is by William Hooper (1774) where he calls it the “Real Apparition.” I start by reading his instructions and scrutinising his diagram (Fig. 2) which, I later learn, is erroneous in two ways: 1) the inverted plant (“c”) is supposed to be a flat image, not a volumetric object, and 2) it cannot be closer to the mirror than its illusory projection at “d”. I then build a “rough draft” of the object following the textual description (Fig. 5). I use a similar conceit for the image – a flower that should be projected in 3D at the location of the real vase. It sort-of works. The apparition of the flower does seem almost 3D and, amazingly, does seem to hover in space. But its location is not quite this side of the

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Fig. 4 Expanded Notation Method for Division.



Fig.5 "Real Apparition" with Rose. The inverted image (left) is behind and below the window; the concave mirror (centre) stands behind that. From the front (right image) the projected illusion is of a flower placed in a vase.

window. I am aiming for this effect because it is promised in the illustration and because it would work best as a metaphor for Kant's idea – that internal representations, or images on the retina, are projected outside the viewing box of the mind onto the perceived world.

This cardboard iteration is a physical instantiation of an initial thought – my mind at work through things. I examine it to see that it is not working, and on this material scaffolding begin, internally, to think through a better design. The next artefact version allows me to "think aloud" materially. I set up the device so that I can move the window back and forth in relation to the position of the image. I discover that, if I place the window well back of the image, the apparition does appear as far in front of the window as I want. I take measurements and then build this discovery into a new material object (Figs. 6 and 7). Happily, this design places the image inside a box so that more of the

force of Kant's metaphor is realised. Kant's idea is the reverse of the *camera obscura* paradigm, and this object is much more like the reverse of the *camera obscura* than the textual descriptions reveal. In the *camera obscura*, 3D objects in the world are projected into the box as flat images. In Kant's box, flat images in the box are projected out into the world as 3D apparitions.

In discussing this building process, I mean to further illustrate Clark's idea that thinking is not restricted to the internal realm of our mind or brain or head. The plan that I eventually chose reflects a decision that was made not exclusively in my subjective consciousness but in an active "assemblage" of mind – artefact – eye – proprioceptive arm (as it moved the window back and forth trying different positions). When I exhibited the Kantian box in Luxembourg, I was delighted to see that it became the object of further thinking by new users who brought their ideas into intersection with this



Fig. 6 Kantian Box. When the illusion is viewed with both eyes, Immanuel Kant's head looks like a ghostly hologram and his chin appears to extend in front of his collar (which is a flat cardboard cutout).

object-knowledge.¹ Science museum director Guillaume Trap, aware of a device in his collection from the 1940s that projects 3D objects with a concave mirror, wanted to test if my device would do the same (Fig. 7). At the same time, he hoped to update Kant by seeing if he could get him to wear a virtual 3D space helmet on his head. Many, including Erkki Huhtamo who has written about "screenology" (2004), were



Fig. 7 Hacking the Kantian Mirror Projection. The concave mirror (left) is obscured by Guillaume Trap's head. Note how deep the inverted image (right) is placed in the box.

amazed to see an image which, perhaps uniquely for the 18th century, does not project on a screen or surface. The thinking of 18th-century artisans, embedded in an object, may renew the thinking of 21st-century theorists.

My experience with the trial-and-error of building gave me the idea of making objects where the end-user could collaborate in this process. My version of an optical theatre was designed in this way (Fig. 8). Eighteenth-century optical boxes invite this approach because there were so many design variations evident both in surviving artefacts as well as in texts such as Joseph Harris (1775). Instead of fixing my decisions in material form, I leave them open so that users can think aloud with the object. Based on his theory of how the 3D effect works in these boxes, Harris recommends that the distance between the image plate and the

1. The exhibition was part of the conference "Doing Experimental Media Archaeology: Practice & Theory", 8 September 2022, Université du Luxembourg, Esch-sur-Alzette, Luxembourg.



Fig. 8 Optical Theatre. Here is the open structure of the optical theatre viewed from the back. On the left is the back of the image-plate decorated to invoke backstage machinery and including an actual brass wheel that changes the shape of the plate. In the middle is a coulisse framing the view, and on the right is the lens, viewed from behind. The viewer enters the curtain and looks through the lens from inside the enclosure. The decorations of many 18th-century optical boxes reference their affinity with theatre and opera houses – I have emphasised that genealogy here.

lens be the same as the focal length of the lens. He recommends long focal lengths – from 24 inches (60 cm) to 36 Inches (90 cm). So, I designed my box with replaceable lenses – a 24-inch and a 35-inch (Fig. 9). The image-plate slides on a track (Fig. 10), so the user can try different distances, assess the experiential effects and judge whether Harris’s predictions are correct and if so (or if not), then think about why. While most 18th-century boxes have flat image plates, Harris believes that a concave curve enhances the 3D effect. I designed my box so that you can change the curvature with a dial at the back (Figs. 8 and 10). My



Fig. 9 Optical Theatre Lens. The inner lens (15 cm diameter; 60 cm focal length) can be removed and replaced with a larger lens (20 cm diameter; 90 cm focal length) that sits in the larger circular frame.

box is intended as a kind of open material dialogue with Harris and 18th-century artisans.

I view past artefacts as the remnant scaffolding of extended cognition of the past. When design choices are fixed, a mental act becomes reified in the final device – not so much thought frozen in an artefact as the original artefactual element of the



Fig. 10 Optical Theatre: Moveable Image Plate. Here you can see the track along which the image-plate can move and the adjusting handle below. You can also see how the image-plate can be curved or, by adjusting the knob at the back, be allowed to flatten again.

thought available for inspection. Clark's approach to cognition, which I am adopting here, is materialist rather than platonic. The platonic idea is always an immaterial substance. While it may become the ghostly "form" of a designed object, that object is never more than an index of something else – the idea – that is fundamentally different from it. Immaterial ideas

in this model are known only by immaterial minds or "souls" and remain locked within private spheres of consciousness. The theory of extended cognition suggests that, at least sometimes, external artefacts literally *are* components of thought – as though the computer circuits of the mind were laid bare for all to see. If an historic artefact is a component of mind, then we can potentially think with our historic predecessors through the *exact same* scaffolding of thought. This possibility offers a new epistemological guarantee to historians that is unavailable within the realm of texts only (understood as symbolic proxies of private ideas). We are privy to the thinking of historical others and there is at least some similarity between their thinking and ours because we share much of the same scaffolding or infrastructure of thought. Much of this infrastructure is public and well known, like the notation of long division. Much of it can be accessed through artisanal tinkering.

Mind and matter, mental work and manual work, intellectual and artisan, are powerful binary opposites in Western culture. As with so many such oppositions, it is a value-laden binary – the first has greater value and prestige than the second. Very few academics in the humanities and social sciences have the training or inclination to cross this fundamental divide between the study and the workshop. Bridging that divide involves rethinking cultural prejudices and building skills. Those are skills that can be acquired through tinkering with actual objects, or the more immersive process of taking them apart or re-building them. These can be routes towards widely available knowledge in optics, physics and engineering that academics, certainly in the field of media archaeology, would benefit from acquiring. Humanities scholars are often led astray by not understanding how things actually work. Media



Fig. 11 Zogrscope Experiments. Here I have placed a laser pointer in the cradle of a theodolite to measure the refraction of light passing through an 18th-century zogrscope lens. I was able to calculate how this lens would affect the angle of convergence of the eyes when looking at a *vue d'optique*. That angle is greater when one looks at the centre of the *vue* than when one looks at the periphery. So, contrary to what 18th-century writers such as William Molyneux and Edmund Halley (1692) expect, the area that is often meant to be more distant (e.g. the back wall of a cathedral) should actually appear slightly closer.

archaeology is particularly treacherous if one relies only on period texts because period writers themselves often failed to understand the things that they were explaining – the focus of the eye, its lateral range of vision, or the logic of perspective (Bantjes, 2014a; 2022; 2014b). When I began reading in this area, I frequently found I had to resort to experiments to sort out the tangle presented by often difficult texts (Fig. 11): what does the writer think is true and why; what is actually true; and

if the writer is mistaken, what theories or paradigm assumptions allowed the error to make sense to them?

The Artisan and Machine Art

I want to return to the theme of the allure of historic artefacts and the value of beauty in experiential media archaeology. Many of the devices were, after all, meant as toys to amuse and delight people with wondrous images. Contemporary artists have been inspired to create new imagery for old media – playing at the intersection of modern sensibility and an archaic idiom. Ana David Mendes² and I invited Media Arts students to do this in the workshop “Seductive Artifacts: Paradigms of Representation and Perception 1637–1860” which we organised for the Artistic Research in Optical Media event at Lusófona University this autumn. This is another form of experimenting with what works (or does not work). What can an old medium say to the present? How does the medium shape and colour the message? To what extent does the medium become the message?

I also want to think about beauty in relation not to the making of images, but to the making of the objects themselves. What makes them attractive objects? Can I, as a builder, experiment with aesthetic variations within an archaic idiom? The material itself, brass, for example, can be seductive – its leaden density, its dull sheen, its permanence. Period material substances – dark hardwoods, brass, ivory – and period finishes such as hand-rubbed oil are a kind of idiom that the maker

2. Ana David Mendes is currently a PhD candidate in Contemporary Art at the University of Coimbra. She has been coordinator and artistic curator of Banco das Artes Galeria, the Municipal Gallery of Contemporary Art in Leiria, since 2018. She co-founded m|j|lmo (The Museum of the Moving Image) in 1996, and was museum coordinator until 2013, and scientific and artistic coordinator until 2017.

can communicate with when he/she re-constructs or re-interprets these devices. Even the tools of the period have this beauty and using them is a pleasure in its own right.

To convey what I want to say about the aesthetics of “a build” I will confess to a love for custom-built motorcycles (whose internal workings are exposed and become part of the surface style of the machine) and contrast this work to the aesthetics of steampunk. Steampunk artists, along with Dadaist machine artists, understand the attraction of late-19th-century gears, valves and dials but regard them as machine totems whose function is mysterious. They assemble them in fantastic constructions that could never work. Theirs is an aesthetic of the surface – rather like Foucault writing about Enlightenment physiology. By contrast, custom-builders are mechanics and amateur engineers who understand not just how their machines work but how they could be redesigned to work differently, or better or more beautifully. Their artistry consists of stylish machine innovation – often witty, self-referential or ironic (Fig. 12). The inventive re-purposing of machine elements often speaks of do-it-yourself agency and originality. That originality works within an established idiom – an aesthetic homage to the logic of industrial-age machine parts (chains, gears and levers) and materials (copper, steel, welding and chrome). I take inspiration from this working-class art.

I often see this spirit in the work of 18th- and 19th-century artisans. It is certainly the spirit I drew upon in making the Wheatstone stereoscope. I started with a plain prototype directly inspired by Wheatstone’s original drawings. He clearly wanted an open experimental design in which conditions could be varied. Like my optical theatre, the image plates are allowed



Fig. 12 Mike Antonov, 2014, “Boo,” Custom Harley, AMD World Championship entrant. Copper tubing, usually used for oil lines, is repurposed by Antonov for a seat spring and an electrical conduit – with echoing flourishes. He also uses wood in quirky ways. Photo credit: Onno “Berserk” Wieringa.

to move closer to or further from the eyes. In his 1838 design (not depicted here) he has synchronised that movement with a screw-mechanism combining left-hand and right-hand

threads. In a later design (Fig. 13) he has the arms pivot in order to change the angle of convergence of the eyes – he records some bizarre observations based on this feature that I wanted to try to replicate. The rigid screw made it impossible to incorporate this feature in the first design. I was tinkering to see if I could think through what I suspect he and his instrument maker also attempted to think through – how to combine both motions in the same machine. I decided to synchronise the arm movement with a pair of wooden gears (Fig. 14). I had to make channels through the gears to run a mechanism to synchronise the movement of the image plates. That mechanism had to flex, so I devised a system of wires attached to moving blocks (the wires cross once to make the blocks pull or push in opposite directions) (Fig. 15). Eighteenth-century theatres often had images (stage flats) that slid in tracks like this pulled by rigging. No stereoscope had been made quite like this before, but its form was consistent with the technical capabilities and design intent of the time.

In my first attempts at this new design, I began in the way that Wheatstone had – building the apparatus up from a rectangular foundation or baseplate. To me it looked squat and ugly. I then questioned why he and I were conceiving of this revolutionary device in terms of rectilinear architecture. Why not draw instead on the machinery of celestial navigation – the 18th-century orrery came to mind (Fig. 3). Why not invoke circular forms and a rotational logic and mount the apparatus on a surveyor’s tripod instead of a stolid table (Fig. 16)? The forms that I created for it on the lathe were meant to be pretty, but also to convey meaning inter-textually by referring to other machine-objects that were available within Wheatstone’s world. Rectilinear architecture was an old metaphor for space

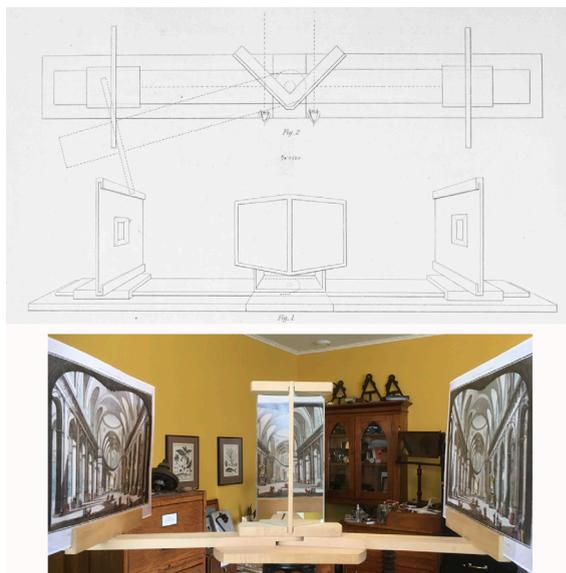


Fig. 13 Wheatstone Design and Replica. The Diagrams are from Wheatstone (1852). The photo is of my “first draft” of a Wheatstone stereoscope. Here I am “hacking” it with two copies of the same *vue d’optique* (rather than stereoviews) to see what happens when you change the angle of convergence of the eyes when viewing. My experience did not conform to what 18th-century theory predicted.

that celestial navigation, surveying (of the curved surface of the globe) and Wheatstone’s discoveries about spatial perception were all challenging. What I made was by no means a replica of Wheatstone’s stereoscope, but rather an aesthetic play on Wheatstone’s project and its position within a constellation of artefacts and debates of his time. Like steampunk, my work aims to seduce us with the material aesthetics of the past, but unlike steampunk, do so in a way that embodies substantial lessons about how things in the past, both physical and intellectual, worked



Fig. 14 Stereoscope Gears. These gears will synchronise the motion of the arms of the stereoscope, which have yet to be attached. Unlike Wheatstone's design (Fig. 13) there are two pivots here spaced at about the inter-ocular distance, so the angular measures more accurately reflect what is happening to the eyes.



Fig. 15 Rigging Channel. The two image-plates are connected through the centre of the stereoscope by wires. When you pull or push one image-plate the other is pushed or pulled symmetrically. Note the "ivory" inlay on the side of the arm (made from deer antler rather than elephant tusk).

Education as Rational Recreation

Up until now, I have been making an argument for experiential media archaeology as a form of research. However, the same sensuous attractions that have persuaded so many to

devote their careers to the historical study of these objects can be extended to students and the public. This idea is not new. Many old devices such as thaumatropes, stereoscopes or the vast array of illusions described by Hooper (1774) and others were thought of as "philosophical toys" (Stafford,



Fig. 16 Wheatstone Stereoscope. This is my second attempt at a stereoscope. It is in homage to Wheatstone's devices rather than a replica. The pivoting arms and circular forms are inspired by the idea of an orrery.

1994). The idea was that students could learn the principles of natural philosophy (i.e. science) through play. Writers like Ozanam (1694), Guyot (1769), Hooper and Harris described the devices and the science lessons that they could convey. John Paris (1827) gives insight into how they were used in practice. Children and adults investigate the devices together. The first step is delight and wonder at the strange illusions they conjure. Peoples' curiosity is aroused, and the next step is questioning. The adults are armed with theoretical knowledge, but they encourage the children to think for themselves and come up with their own hypotheses first before guiding them to the known science. The adults do not lecture; they encourage a three-way conversation between the artefacts, the students' ideas and the adults' ideas. Playing in this way with philosophical toys was also known as "rational recreation".



Fig. 17 Rational Recreation as part of a seminar on 18th-Century Theory, St. Francis Xavier University, 2021.

I have recently begun using this approach in my university teaching beginning with a seminar on 18th-century philosophy and social theory. Here rational recreation, engaging with many of the devices I have discussed in this paper, was a supplement to reading (mostly selections from philosophy of the period), discussing in seminar, and writing (Fig. 17). Artefacts do not always "speak for themselves" and it is helpful to bring some advance knowledge in order to benefit the most from the knowledge that they can impart. These investigations are most productive if left relatively open in terms of their point of arrival. If the teacher holds in abeyance the "right" answer that they have prepared in advance, they often find that students surprise them and come up with better answers. This style of education nurtures people's ability to think independently. Also, in this way, education, the imparting of knowledge, can become research, the discovery of new knowledge. Guillaume Trap "hacking" the Kantian mirror projection is a good

example (Fig. 6). Reviewers of a funding application for this work insisted that I had to choose whether I was going to do research or “dissemination”. Those working in experiential media archaeology recognise that the two are often inseparable (van den Oever & Fickers, 2019, p. 61).

The autumn 2022 “Seductive Artifacts” workshop in Lisbon was with Media Arts students. The texts that they read focused more on perception and representation than philosophy and epistemology. While I hope that they will write about their explorations, I think it would be exciting if they could also create visual work for, or based on, these devices. That could be a very productive way to test and experiment with the devices. We shall see what Ana David Mendes and I learn.

Conclusion

Experiential media archaeology is haunted by nostalgia, the impossible desire to return to an imaginary past in our lives or in our collective history when the world was local, immediate and directly and sensuously apprehended. In this practice, we return only to a proxy and indulge in a sensuous appropriation of the artefacts and technologies of mediation. Only by reflecting on the apparatus of mediation can we hope to better understand how it translates to us the infinite world that we cannot directly grasp. This critical and reflexive project has been underway for centuries.

In this essay, I have justified this practice as a historical methodology, one that can help us fill in gaps and silences in historic texts. Experiential media archaeology can work as “material hermeneutics” in the sense that immersion in the rich

material context of past media can bring to light connotations and resonances hidden in the language and metaphor of past texts. Much of my own work has been directed towards enhanced historical understanding in this way.

I have used a recent theory of extended cognition to strengthen the case for experiential media archaeology as method. Media artefacts are part of our extended architecture of perception and thought that is public and potentially accessible to all. The idea that the mind is not limited to the private interior offers a way of overcoming the lonely subjectivity that has dogged Western epistemology. The larger problem at issue in this work is how we come to know the world and how our necessary mediations of knowledge and perception enhance, constrain and shape what we can know. In these two ways, experiential media archaeology has epistemological relevance.

Finally, I have considered experiential media archaeology as an artistic practice. Since the early last century, Modernist visual high-art has been preoccupied with mediation – self-reflexively with the medium of painting. In the 1970s, new technological media, such as video, computer graphics and holography, inspired a new wave of machinic, kinetic and performative art that was media-reflexive (Grau, 2003; Schröter, 2014). Old technological media are being welcomed back as the “O.G.” (original gangsta) of this tech-positive tradition such that at conferences like ARTECH (International Conference on Digital and Interactive Arts), artistic works for VR (virtual reality) and AI (artificial intelligence) are side-by-side with artistic works for the 19th-century phenakistiscope. I have made a case here for aesthetically re-imagining, not just the imagery

for old devices, but the devices themselves in ways that comment on their meaning and beauty without compromising their original logic and function.

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