Title slide: Remaking Old Media

Thanks to Richard Rath and David Goldberg.

Computation excels at processing and re-presenting content that already exists in our corpora and collections. For instance, statistical and graphical techniques may help us approach a million documents that would be difficult to interpret without a programming language such as R. However, when conducting this computational research, one common question—as Lauren Klein reminds us in "The Image of Absence"—is how we might account for who or what is missing from the corpora and collections at hand. Today I would like to focus precisely on this issue of absence by exploring three case studies in media history.

Slide: Case studies

These three case studies—what I'm calling the alleged experiment, the ignored developer, and the missing mechanism—are premised on remaking old media that are not found in archives or no longer function as they once did. And they are based in laboratory research I have been conducting with Tiffany Chan, Katherine Goertz, Danielle Morgan, and Victoria Murawski acros s the Humanities and Fine Arts at the University of Victoria. As I hope to show, they demonstrate ways to use new technologies to *prototype absences in the historical record*—to fabricate materials that function as *negotiations or situations for interpretation*, not as products, replicas, reproductions, or even objects. Put this way, prototyping the past is like writing one's way through an archive. It is a form of inquiry. And in this instance, it stresses aspects of history that are difficult, if not impossible, to compute.

Slide: The alleged experiment

My first case study, the alleged experiment, purportedly occurred during the 1890s, when sound was impressed onto piano wire. For it, we'll ask, "what did this experiment sound like?" But first, some background.

Slide: Oberlin Smith

At least in writing, one of the first magnetic storage media was thread, on which—in the September 1888 of *The Electrical World*—Oberlin Smith claimed sound could be recorded. Smith imagined thread as a lightweight and affordable means for quantifying the content of a given message, not to mention the time invested in its communication. He suggested: "The Lord's Prayer could be written upon a few feet of thread or string, while a young lady receiving a small spool of cotton from her lover would think herself abominably neglected if it was not 'warranted 200 yards long.'" In the case of a ritual communication such as the Lord's Prayer, only a few feet were required. Meanwhile, the complexity of love and its labors warranted at least two hundred yards.

SLIDE – Clark's Cotton Thread

During the late 1880s, those two hundred yards were guaranteed to all consumers of, say, Clark's spools of "Our New Thread" crochet or darning cotton. Since the spools were small and tightly wound, the length of wrapped thread was impossible to determine with a naked eye. Consequently, Clark and other thread companies assured buyers that they were in fact getting the two hundred yards they purchased. Understood this way, Smith's early ideation of audio on thread not only enabled a metric for abstracting labor from the messiness of everyday practice—or, more specifically, converting the time spent authoring a message into the number of feet on which it is stored. It also demanded faith in the medium—a faith that thread would store sounds naturally, authentically, and exactly as they existed prior to their mediation.

Indeed, *Smith rendered his storage medium immediate* precisely because of its magnetic character. Magnetic recording would not "inscribe" or "write" sounds. *It would "capture" and "impress" them,* affording reliable, indexical relationships without perceivable traces remaining on the storage medium. What makes this case of early magnetic recording unique, then, is that Oberlin Smith bundled the abstraction and standardization of sound with a critique of mechanical noise, namely the friction between a needle and groove caused during the playback of mechanically recorded sound inscribed on tinfoil.

SLIDE – Menlo Park

Smith visited Thomas Edison's Menlo Park laboratory—pictured after reconstruction here—in early 1878, ten years prior to his publication in *The Electrical World* and just after Edison patented the cylinder phonograph. While examining Edison's new device, Smith was struck by a scratchy noise generated during playback. It was a noise that mechanical recordings simply could not avoid, and it offended Smith's ears. As a response, he proposed magnetic recording, where no audible, physical contact would be made between a storage medium—such as cotton thread—and the playback mechanism—such as an electromagnet. This same arrangement is now central to data storage via mechanisms such as hard drives and—of course, prior to those—magnetic tape.

SLIDE – Hard Drive

But thread never caught on. One reason is economic. Even if thread was an affordable and lightweight medium, Smith presumably had no time to develop magnetic storage. Or he did not consider it a worthwhile investment. Like Edison and his work on incandescent light during the 1870s and 1880s, Smith put sound aside in order to pursue endeavors in other sectors, namely metal and coin press machinery.

SLIDE – Ferracute

By 1910, his Ferracute Machine Company—located in Bridgeton, New Jersey, just three hundred miles south of Edison's Menlo Park—supplied presses to the U.S. Mint, Eastman Kodak, Chrysler, Cadillac, Ford, and many others. With a list of customers such as these, the press machinery business was obviously far more profitable than magnetic storage, especially since Smith's conceptualization of storage was impractical at best. *After all, thread alone cannot store sound*. In order for Smith's idea to work, magnetic fiber must be spun through the thread, and that spinning process is incredibly laborious. True, in his writings on magnetic recording, Smith does list other possible cord substances, including wire and chain. Still, historians are unsure whether he ever invented a system where any medium reproduced audible results. They are, however, quite certain that he never obtained a patent for magnetic recording, a magnetic recording device, or a magnetic storage medium.

SLIDE – Trolley Diagram by Camras

In fact, it was not until about 1898 that Smith's idea was actually implemented. Although there is no evidence that he read Oberlin Smith's work, that year Valdemar Poulsen—an engineer—experimented with storing voices on piano wire, not thread. Hardly documented and rarely referenced in media studies publications, these experiments initially occurred in his laboratory at the Copenhagen Telephone Company in Denmark. As this illustration by Marvin Camras suggests, Poulsen would stretch wire across the diagonal width of a room, from the top corner to its opposite bottom corner. To that wire, he would attach a trolley, which carried an electromagnet, battery, and telephone transmitter. These component parts are pictured here, in an illustration by Danielle Morgan.

Slide – Component Parts of the Trolley

As the trolley rolled down the wire, Poulsen would run alongside it, shouting into the transmitter. This process would then be repeated, but with a receiver instead of a transmitter. As the trolley rolled down the wire again, Poulsen would have a friend listen to the playback through a telephone earpiece. The playback could be repeated with people taking turns to individually listen. Better yet, they could then witness Poulsen wiping the record clean with a strong magnet, only to rerecord on the same medium.

Also mentioned in Oberlin Smith's early writings, this notion of erasing and rerecording cannot be underemphasized in the histories of magnetic storage, especially as they inform present-day practice. When compared with other, seemingly less-reusable options—such as shellac discs and wax cylinders—piano wire became an appealing alternative. *It was a rewritable medium, and being able to rewrite a record ironically implied increased odds of perfection*. A second take—or an edit—gave people a sense of agency, an opportunity to finally capture—*but actually reconstruct or make*—the ostensible essence of a moment and defer it for listening later.

SLIDE – trace of recording

Prototyping this ephemeral experiment—*which did not produce a recording that outlasted the 19th century*—allows us to better understand and see how otherwise obscure, early magnetic recording processes may have worked. For instance, as this image suggests, today we may use iron fillings to locate recordings on piano wire and then estimate their duration. This experience contrasts quite drastically with contemporary magnetic storage media, the impressions of which are impossible to see with the naked eye.

Slide – prototype

Additionally, prototyping early magnetic recording highlights the degree to which piano wire is subject to severe fluctuation during playback, especially since Poulsen's design—modeled here—was guided by hand and tethered to demanufactured phone parts. Contrary to claims by C. K. Fankhauser—who managed a magnetic recording business at the turn of the century and claimed that, with magnetic recording, an "operator has perfect control of his record, may erase or retrace any part of it at any time by simply pressing the button"—control over the recording process was limited and highly contingent upon various embodied procedures. Based on our laboratory research at the University of Victoria, the result of such contingencies are brief recordings, which—during playback—are difficult to hear and interpret, let alone digitize or compute. (In fact, recording onto piano wire usually requires screaming with a high pitch.) Nevertheless, these recordings give us a tangible sense of how today's data storage processes—which are almost always screen-oriented and expressed symbolically—have a long history in sound.

SLIDE – THE IGNORED DEVELOPER

My second case study—the ignored developer—keeps us situated in sound, but with an emphasis on conversion over recording. In this particular case, maintenance—not creation, innovation, or obsolescence—is a key theme, and we may ask "who helped the machine?" Consider the following.

Slide – the optophone machine

The reading optophone was an aid for the blind that converted text into sound during the twentieth century, beginning in the 1910s. Although it never existed in a stable or fixed form—and no stable, working version survives today—a common configuration involved operators placing books and other print materials on glass. They then used a handle to move a reading head located below the glass, sliding it back and forth to scan pages. As pages were scanned, the machine would express type as a series of audible tones. To listen, operators plugged telephone receivers into the device and wore them over their ears, like headphones.

As this image suggests, reading optophones had open frames, which encouraged a variety of interactions. The structural transparency allowed operators to physically control the pace and location of reading. Operators could also tune the optophone with a knob, as observers witnessed how they used the machine. Watching someone control the instrument while also seeing the mechanism move created an experience that was social—linking observer, operator, and machine through the material processes of text-to-sound conversion. This unique configuration produced an interesting tension: even though the architecture of reading optophones was open, it facilitated a private acoustic sphere premised on dedicated listening.

Today, optophones are typically interpreted as precursors to optical character recognition (OCR), or the automated conversion of images into machine-readable text common amongst initiatives such as Google Books. However, that origin story risks bypassing how optophones were developed and maintained over time.

SLIDE – Mary Jameson

Pictured here, Mary Jameson, who was blind, played a central role in this development, while E. E. Fournier d'Albe is credited with the invention in 1913 and patent in 1919.

The few times Jameson does appear in the historical documentation, she is typically described as a demonstrator or "user." These descriptions diminish her contributions to media history by failing to recognize the significant labor she contributed to the optophone project as it changed from one version to the next. (So, for instance, the build of the machine morphed several times, and it converted type into sound using at least four different mechanical techniques.) From this perspective of maintenance and development, prototyping the optophone helps us better understand how Jameson *helped the machine*, without assuming we can ever inhabit her embodied position in time or empathize with how she experienced the world during the 1900s. (Mention Sterne.)

Gathering materials from historians and archivists, including—in this case—Robert Baker (with Blind Veterans UK), Mara Mills (at NYU), and Matthew Rubery (at Queen Mary University of London)—we can prototype the optophone's frame, creating it from historical diagrams, descriptions, and images.

Slide – modeling video

Since no source material is absolute in its articulation of how optophones looked and functioned, this process involves combining digital images with printed matter to approximate dimensions, and then resolving information gaps via a close analysis of the spatial interiority of 2D images in comparison with how tactile models stand not only in physical space but also in relation to people's bodies.

Slide – cutting the model

SLIDE – prototype of the frame

After studying the frame this way, we may notice how, throughout the first half of the twentieth century, sighted people exaggerated the accessibility of reading optophones. For instance, in publications such as *The Moon Element*, Fournier d'Able stresses the listening process over the demanding procedures of moving and navigating books on an optophone, as if these procedures will come naturally to anyone using the open frame. Additionally, prototyping other optophone components foregrounds how they shifted over time, partly due to decisions made by Jameson but also with the effect of repeatedly alienating people—especially new users—from the conversion process.

SLIDE – tracer

Reading optophones used a "tracer" to convert printed material into an electrical signal and then into sound. Tracers were made with selenium, which becomes more or less conductive based on light absorption. They would scan words with beams of light, each keyed to a different frequency. These beams would produce a continuous stream of noise and silence corresponding with their movement across the page. Some iterations produced tones when they scanned type, while others produced tones when they scanned negative space. Here's a series of example tones, which Mara Mills recently acquired while conducting research on optophones.

Slide – optophone sounds

These tones could be played through telephone receivers that operators wore on their ears. With practice in this dedicated acoustic space, operators learned to interpret each tone or series of tones as letters and words. Historical documents suggest that, after years of practice, Mary Jameson read at a rate of up to 60-words-per-minute on an optophone. But of course, this rate depended tremendously on which reading optophone Jameson was using, when.

SLIDE – Rpi

If we prototype these versions using the Python programming language, and process the conversions using a microprocessing platform such as the Raspberry Pi—pictured here—then we get a sense of just how intricate the conversion and interpretation were, despite the fact that sighted people such Fournier d'Albe suggested they were quite simple. What's more, if we study how reading optophones changed from version to version, then we also get a concrete sense of how much Jameson—almost always without credit—improved the optohone through constant testing and experimentation. Put this way, Jameson is a key, unrecognized developer of present-day OCR research, and her work offers an alternative to "make or break" narratives prevalent in histories of technology, whereby innovation and disruption are privileged (often with hyperbole) over the everyday work of helping and improving machines. From this perspective, prototyping media history becomes entangled with rewriting it—with adding an otherwise absent Jameson to the historical record.

Slide - The Missing Mechanism

My final case study, the missing mechanism, unpacks the invisible interior of an ostensibly automated memento mori. Here, the question is whether the mechanism ever worked in a persistent fashion.

SLIDE – the pins

Illustrated here, electro-mobile jewelry was made in Paris during the 1860s. At the time, the pieces were understood as personal ornaments *and* innovative gadgets. Today, we might call them early wearables. Although wearables date back to wristwatches from the 1790s, *bijoux électro-mobiles* from Paris remain some of the earliest—and most ignored—wearables across histories of fashion and technology. Among these electro-mobile pieces were bird-shaped hairpins as well as skull and rabbit cravat pins (or "stick-pins"). As Charlotte Gere and Judy Rudoe suggest, these pieces are "objects that would be hard to believe existed were it not for the contemporary documentation."

SLIDE – the skulls

Only one of these pieces is currently housed at a memory institution: an electro-mobile skull stick-pin at the Victoria and Albert Museum in London. It is possible, too, that none of the other pieces in the previous slide existed as anything other than an illustration, prototype, or one-off. I am rather certain, though, that none of them, including the skull, was ever mass-manufactured. Designed by Gustave Trouvé—an engineer and instrument-maker—and made by Auguste- Germain Cadet-Picard—a jeweler—the electro-mobile skull at the V&A is 9.2-centimeters- tall, 1.5-centimeters-wide, and 1.6-centimeters-deep. Dated 1867, it is made of gold and enamel with diamond sparks. Originally, the eyes of this "death's head" were said to roll, and the jaw was said to snap, both when charged by "a miniature hermetically sealed battery" hidden inside the wearer's pocket. The intended wearers were middle-class men—such as merchants and entrepreneurs—who could afford novelties. A work of neither high art nor exquisite jewelry, the electro-mobile skull aimed to entertain. To be sure, it was never fashionable.

Today, the skull stick-pin at the V&A is not animated. Indeed, batteries are not included. They did not stand the test of time, and thus the skull's eyes and jaw do not move automatically. The piece is also behind glass and cannot be handled—let alone demanufactured—by researchers. This means the skull's interior remains nearly invisible to audiences, with the mechanisms for animating its eyes and jaw rendered opaque. What is more, Trouvé's archives were somewhat recently destroyed in a fire. With these factors combined, determining how Trouvé and Cadet-Picard animated the skull—*if they actually animated it*—is difficult. However, some digitized illustrations of *bijoux électro-mobiles* remain, including this illustration of an electro-mobile rabbit:

SLIDE – illustration

With some additional research and contextualization, including newspaper publications about the stick-pin's demonstration at the 1867 *World Exhibition* in Paris, these 2-D images can be translated into a functioning electro-mobile skull, which—as this image suggests—was animated by a mechanism found in interrupter bells. The mechanism resembled what is typically called a solenoid today.

Slide – solenoid

After the development of electromagnets during the 1820s, interrupter bells were common in Europe by the 1860s. They were found in doorbells, alarms, telegraphs, and—later in the century—telephones, too. These everyday devices probably informed Trouvé's electro-mobile pieces.

SLIDE – small skull

Relying on digitized illustrations, we may combine nineteenth-century bell and jewelry designs to create functioning prototypes of the skull stick-pin. While the prototypes may not be exact reproductions of the original, they give researchers a tangible sense of its composition. With computer-aided design (CAD) software and CNC machines, we may also experiment with large-scale prototypes, which are easier than the original to examine and test by hand.

Slide – wood skull

Slide – skull model

SLIDE – large skull

Collectively, these prototypes serve as situations for research across meaning and matter, with an emphasis on the assumptions under which the skull stick-pin was made and used. As the prototypes re-contextualize the past in the present, they also inform future design practices. Consider three interpretations of the skull stick-pin.

SLIDE - blank

First Interpretation

The skull stick-pin at the V&A was novel in the 1860s because it combined electric bell designs with designs for mourning jewelry and personal ornamentation. This historically unique combination resulted in a popular attraction that also received rather negative reviews from critics. As one may guess, the pin was ultimately deemed more of a technical achievement than an aesthetic innovation. However, it also operated across several social and cultural registers, as a commentary on nineteenth-century protocols for bereavement and dress.

While mourning jewelry is typically understood as a gesture of remembrance and respect toward the dead, it is also a *memento mori*: a reflection on mortality and transience—on the inevitably of death and the passing of time. During the 1860s, fashion appropriated various mourning mementoes—skulls, bones, hair, and teeth—from centuries ago, with mourning jewelry frequently functioning as a status symbol. While it was accessible to many, the quality of materials worn nevertheless marked class and social standing. Lou Taylor writes: “Special jewellery and accessories become yet another expensive item to be added to the long list of requirements considered socially essential after bereavement.” Indeed, across Europe, including England and France, decrees as well as norms of etiquette, gender, and sexuality regulated mourning during a time when, by today’s standards, mortality rates were high and life expectancy was low, particularly in urban areas. After a death, mourning jewelry was to be worn almost immediately, and there were prescribed stages of mourning as well as acceptable jewelry colors, usually white, black, and gold.

Popular publications proliferated these dress rituals by helping to commodify death. While offering suggestions for mourning fashionably, magazines documented how high society mourned in public. For instance, on April 1, 1867, the *Ladies’ Treasury* in London reported how Queen Victoria was publicly mourning the 1861 death of her husband, Albert, Prince Consort: “At the Court recently held by the Queen, Her Majesty wore a black silk dress, with a train trimmed with crape, and the Mary Queen of Scots cap, with a long veil of white crape “lease,” and a coronet of jet. Her Majesty also wore jet ornaments, the Riband and Star of the Order of the Garter, and the Victoria and Albert Order.” Among these, jet jewelry—such as French jet (a type of glass) and Whitby jet (a type of fossilized wood)—was quite popular during the period. Across Europe, but especially in England, mourning jewelry was a lucrative industry. Businesses that invested in jet mining, carving, and supply thrived during the 1860s and ’70s, and they did so without bespoke production. Since mourning pieces were worn just after a death, they were simple and impersonal, making them all the more conducive to standardized manufacture.

Slide – Taste

Alongside the popularity of mourning jewelry during the 1860s, men routinely wore—and were expected to wear—pieces such as cravat pins, rings, cuff-links, and neckwear. Later in the century, watches and watch-chains gained traction. As with mourning jewelry, these pieces marked status and wealth, and they, too, were regulated by norms of etiquette, gender, and sexuality. On the topic of stick-pins in particular, Gere and Rudoe write, "Stick-pins were vehicles for little masterpieces of jewellery, for novelties of all kinds, including mottos and puns." This observation applies to the electro-mobile skull.

A novelty somewhere between mourning jewelry and personal ornamentation, it is a pun on *memento mori*: With its snapping jaw, death literally reminds people of itself. An ornament not only made of gold but to be worn on the chest, it is also a rather playful expression of death's reminder. It could have even been a joke directed at British severity about Albert's passing. It may have mocked the sternness of Victorian dress guides that advised against trends, false jewels, elaborate styles, and conspicuous dress. And it may have reveled in mourning culture as a lucrative industry at the time. Whatever the interpretation, it certainly experimented with decrees and etiquette. Yet, in so doing, it actually reaffirmed their potency. It demonstrated how, more often than not, puns in design merely accentuate the pervasiveness of norms.

Slide - blank

Prototyping this pun foregrounds how, as both metaphor and matter, it intersected fashion with technology, mourning with ornamentation, jewelry with gadgetry. The pin is treated not as a complete object to be consumed but rather as a series of component parts to be reverse-engineered and reassembled. Doing so traces how seemingly diverse materials—

diamonds, gold, wires, electromagnets, iron, carbon, zinc—collectively became a novelty in 1867. It also tests historical accounts of the pin. Shaped by the rhetoric and whiz-bang of grand exhibitions, these accounts lean toward the hyperbolic, and they come with their own assumptions. For instance, after attending the *World Exhibition* in Paris, a reporter for *The Times* in London said a button caused the "death's head to chatter and roll its horrid eyes." Aside from the value judgment implied by this description—which rehearses cultural apprehensions toward animating inanimate objects, or giving life to the dead—the stick-pin was not button-triggered. Instead, the wearer actuated a hermetically sealed, 1.5-volt pocket battery—made of zinc and carbon and activated by ammonium chloride—by flipping it from a vertical to a horizontal position. Perhaps this detail is too fine-grained, but it meant the wearer had less agency over the skull's animation than a button would afford. In this sense, electro-mobile jewelry differed from electric bells found at hotels and railway stations during the 1860s.

For current design practice, the stick-pin's composition and cultural function remind us that wearables are not merely additive or superficial. They should not be reduced to symbols or accessories, or to forms of romantic self-expression. They are imbricated with protocols that shape choice, behavior, identity, and interaction. Today, with wearables producing data about people's physical and social activities, this lesson is all the more important.

Second Interpretation

An electrical engineer trained in clock- and watch-making, Trouvé specialized in experiments with miniaturization. In 1882, *Scientific American* borrowed language from Alexandre Dumas to suggest that Trouvé's fingers had "at once the strength of those of the

Titans and the delicacy of those of the fairies," noting, too, that "[i]t is in small works that electricity excels." Later, in 1891, George Barral claimed: "One cannot imagine anything more charming, more graceful, more fun than these little figures animated by Trouvé's Lilliputian battery and his electro-motor so microscopic that it can fit in 3 cubic millimeters, barely one one hundredth of a sewing thimble." These inflated comments position the stick-pin as a crafty gadget. Together with the technical terminology, there are references to technological progress and material achievement as well as to skilled manual labor. Read collectively, the language marks an alignment of aesthetics and miniaturization with mastery and positivism. As Susan Elizabeth Ryan observes of early wearables, such an alignment is historically masculine. During the 1860s, it was also steeped in nostalgia, or a yearning for unadulterated life found in miniatures at the fingertips.

Susan Stewart argues that "[t]he miniature does not attach itself to lived historical time. . . . [A]s an object consumed, [it] finds its 'use value' transformed into the infinite time of reverie." Following Stewart's logic, crafting the electro-mobile skull was synonymous with crafting private time, which—during the second half of the nineteenth century—intersected with the recovery of authentic skills and preindustrial labor amidst the emergence of industrial capitalism and factory work. Here, the pin's size and use are crucial. Again, it is 9.2-centimeters-tall, 1.5-centimeters-wide, and 1.6-centimeters-deep, and it fits easily in a cravat. It is handmade, and its battery—ostensibly "one one hundredth [the size] of a sewing thimble"—is called Lilliputian, a reference to Swift's *Gulliver's Travel*s. Returning to Stewart: "As is the case with all models, it is absolutely necessary that Lilliput be an island. The miniature world remains perfect and uncontaminated by the grotesque so long as its absolute boundaries are maintained."

Slide – battery

A source of power tucked in a coat pocket, the battery is not only small. It, like its engineer, is hidden from view, heightening its influence as both pun and trick by separating it from the skull's performance higher on the body, nestled in a cravat. The material particulars of design, or how this becomes that, matters less than the effect and experience of animation. In fact, too much attention to particulars would contaminate the boundaries drawn between the miniature and its power source.

Slide – prototyped battery

Prototyping this miniature attends to exaggeration in its historical description, yet it also identifies where the skull may resist desired effects. Attention to such surprises exposes some of the humanist impulses—for example, assumptions that people control matter—in Stewart's arguments while granting significant legitimacy to tacit knowledge—both then and now—of the stick-pin.

Of course, prototyping an electro-mobile wearable at scale remains quite difficult even today. However, this difficulty need not reaffirm masculine histories of mastery and manipulation. And it need not facilitate an homage to Trouvé, Cadet-Picard, or preindustrial craft. In fact, it should do quite the opposite: raise questions about the degree to which the discourse of miniaturization corresponded with what was actually made, how it was made, whether it was made, how it was maintained, and how reliable it was. After all, the inflated discourse around early wearables may also explain, at least in part, why so few *bijoux électro-mobiles* exist off paper and screen today.

Slide - blank

Final Interpretation

To communicate the technical particulars of electro-mobile jewelry, Trouvé published two illustrations of the electro-mobile rabbit's interior. While few scholars have written about electro-mobile jewelry, publications across academic and popular venues tend to reference only these two illustrations. What has not been addressed is the fact that Trouvé also designed an electro-mobile "turk," which, together with the rabbit illustrations, is the only surviving representation of the jewelry's inner workings. While one of the rabbit illustrations was published in *Nature* in 1879, this image only appears in Barral's 1891 Trouvé biography.

SLIDE – Illustration

The illustration suggests that, like many other nineteenth-century engineers, Trouvé redeployed Wolfgang von Kempelen's orientalist construction of the chess-playing Mechanical Turk automaton (1770) for his electro-mobile designs. As Ayhan Aytes explains, the Mechanical Turk performed "a particular form of docility that conveys the idea of the disciplined productive body." The chess-playing automaton was in fact a mannequin manipulated by von Kempelen's assistant, who hid in a cabinet at the base of the mechanism and controlled its behaviors. Through this articulation of technology and culture, the Mechanical Turk embodied orientalist assumptions that enlightened, white minds in Europe could program racial others and render them media for rationalist expression. Even if Trouvé or Cadet-Picard unconsciously revitalized these orientalist assumptions through electro-mobile jewelry, the important fact is that the assumptions persisted—via design—well beyond von Kempelen's eighteenth-century automaton. In fact, as Aytes points out, von Kempelen's model persists today. In 2005, Amazon named its online micro-tasking platform the Mechanical Turk.

Ultimately, prototyping the V&A's electro-mobile skull stick-pin underscores how the Mechanical Turk (in particular) and orientalism (in general) are meaningful not only as concepts or metaphors; they are also mechanics operating through models and matter over time.

Slide – all jewelry pieces

Across Trouvé's various electro-mobile designs, his use of an electromagnetic mechanism is consistent. To borrow language from present-day software rhetoric, he simply changed the "skins" of the jewelry pieces. At the time, this combination of consistent mechanics with aesthetic variation was anchored in an electromagnetic worldview, or the belief that electromagnetism could account for all scientific *and* natural phenomena. For Trouvé and others, electricity and magnetism were thus ways to control life itself. From an engineering perspective, they were also ways to automate von Kempelen's assistant and delegate his decisions to a technology. If we map Stewart's interpretation of miniaturization onto an electromagnetic worldview, then von Kempelen's Mechanical Turk could not only be further manipulated through a change in scale, reducing it to a piece worn on the body. Von Kempelen's logic could also be extended to all bodies and life forms. Put this way, during the second half of the nineteenth century, electromagnetic mechanisms became vehicles for rationalist expression through human *and* non-human others. The use of "skins" to render these mechanisms opaque merely increased the appeal of instrumentalist design and its perceived effectiveness as a logical paradigm. Today, the trajectories of design practice can learn from this history by recognizing that the past is more than a mere referent. It is an active ingredient of technologies across their construction, circulation, and use, even if it does not determine their development.

SLIDE – Conclusion - blank

To conclude, I would like to reflect upon arguments I made today by suggesting that prototyping absence need not aim for a totalizing or rational history without remainders. Instead, it can recognize how many aspects of the technologies we use to reproduce history exceed our control, access, and understanding. Indeed, the speculative elements of prototyping can be ironically anchored in the specificities surrounding historical absences—of what we cannot prove or do not know for sure but certainly shapes us. Most important, prototyping absence and remaking old media may concern themselves primarily with the *contingent* relations between matter and meaning—with their entanglement in acts of interpretation. To be clear, prototyping absence is not metaphysical project. It is a realist one, moving from the particulars at hand, to conjecturing what may have been at hand, to prototyping an otherwise inaccessible apparatus in the present, with considerations for future practices. Rather than fetishizing history, it pursues an objectivity it knows it cannot achieve in the first place.

Slide – thanks