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9. Can We Have the Cave and Leave It Too? On the Meaning of Cinema as Technology

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Abstract
The debate about technology in film and media studies, as in other disciplines, oscillates between techno-determinism and social constructivism. For techno-determinists, technology and its development drive the history of media, while for social constructivists, technology can only be understood by way of the social forces and dynamics that produce and shape them. This contribution argues that these alternatives should be understood as two facets of what we might call Plato's uncertainty principle. Plato's allegory of the cave illustrates, among other things, a basic indeterminacy in our understanding of technology. You can either focus on the (social) meaning of technology, or on its structure, but the two aspects seem to be mutually exclusive. This contribution argues that a theory of cinema as technology needs to come to terms with this problem.

Keywords: film theory, Plato, philosophy, interdisciplinarity, consciousness

Technology is the infrastructure of cinema.
– André Bazin

Without technological detours, the properly human cannot exist.
– Bruno Latour

One of the most celebrated cuts in the history of cinema occurs near the beginning of Kubrick's 2001 – A Space Odyssey. A savanna-dwelling hominid has just beaten one of his kin to death with a large bone. In a
flash of recognition of the bone's awesome powers, he throws his weapon up into the air. The camera follows the bone's upward, then downward trajectory. Cut from the rotating, falling bone to a bone-shaped spaceship approaching the camera bottom right against the backdrop of deep space. Bridging several millions of years in human evolution in the blink of an eye, this cut probably marked the longest temporal ellipsis in cinema history until Terrence Malick juxtaposed images of living dinosaurs with images of suburban family life in 1950s America in *The Tree of Life* in 2011. The cut speaks of the marvels of technology: It juxtaposes the ur-scene of the discovery of technology, the moment when the precursors of man turn a found object into a tool which projects the strength of arm and fist into the bone, with the most advanced technology imaginable at the point of the film’s making, the technology of space travel. But the cut is in itself a marvel of technology: It foregrounds cinema’s capacity for apprehending and compressing vast extensions of space and time, to the point where all of history and the entirety of physical space appear to be at the command of a pair of hands, operating with scissors and duct tape on an editing table in the age of linear editing, or at the command of a pair of hands operating a computer keyboard in the age of non-linear editing, i.e. after 1993.

On an iconographic level, one could argue that Kubrick’s famous cut is something of a cinematic correlative of Ernst Haeckel’s famous drawings of ontogenetic recapitulation or of the pictograms, which illustrate evolution through a succession of apes and hominids, leading up to *homo sapiens sapiens*, condensing millions of years of evolution into a striking spatial succession from left to right. At the same time, however, Kubrick’s cut points to the hands that made it: It is an artifact, created by the human use of a man-made technology.1 As such, its meaning extends beyond what the two images show which the cut joins, and even beyond the added layer of meaning that the cut creates by joining them. Precisely to the extent that it is a celebration of cinema itself, the cut raises the question of the larger purpose of cinema as technology. Montage may be the essence of cinema, as Eisenstein suggests. But Kubrick’s cut raises not just a question of what makes cinema a distinctive form of art. Rather, it raises question of what it means to operate a technology, which symbolically commands space, time, and movement.

Now there can be little debate that alongside photography and television, cinema is the dominant technical image medium of the twentieth and twenty-first centuries.2 Yet, a point can be made that cinema as technology remains an understudied topic. To account for the technological aspect of cinema, film studies has largely borrowed its approach from art history:
image, editing, sound, color, special effects have all been thoroughly studied under the rubric of cinematic techniques, i.e. as technologies for the production of art works analogous to the various techniques of painting, sculpture and the other visual arts. Cinema as technology first became a topic within the framework of apparatus theory in the 1970s. As part of an Althusserian critique of ideology and through the lens of Platonian model of the cave, apparatus theory framed cinema as a technology of illusion, which wreaks ideological havoc behind our backs and which it is the task of film theory, as well as critical film practice, to reveal and deconstruct. Yet, even in the face of the onslaught of both critical theory and critical film practice, cinema has proven to be resilient: Revealing the apparatus, it seems, only hardens the fascination, and a critique of ideology that focuses on cinema as a technology of illusion seems to have about the same long-term impact as a making-of documentary, albeit without the short-term benefits in terms of viewing pleasure.3 To understand what kind of technology cinema is, to understand the meaning of cinema as technology and to understand how this meaning matters to our understanding of cinema, seems to require a different approach.

As paleoanthropologist Stanley Amborse puts it, Kubrick’s cut raises a specific question concerning technology: “What happened between the first tool use by our ape ancestors and the first complex projectile launched into flight with another tool?” More specifically, the cut juxtaposes two stages of human and technological development and links human development to technology. At one level, the scene appears to suggest that human history is a history of aggression, enhanced by technology. Yet, not just in appearance, the hominids at the beginning are very different from the humans that travel through space in the later parts of the film. Technology, Kubrick’s cut also suggests, is the way through which hominids evolve into humans. In that sense, the humans that appear in the film after the cut are not just users of technology: Technology defines what it means to be human. The first reading, which connects human development with aggression and tool-based predation, aligns with a pessimist strain of philosophical anthropology.5 The second reading, which connects human evolution not just with predation and tool use, but with creativity, aligns with a line of thought that runs from the philosophy of technology from the nineteenth century through today’s Science and Technology Studies (STS), with support from an important strain of twentieth century paleoanthropology.

To address the question of cinema as technology, I want to follow through on the second reading. I want to start from the assumption that to understand the “properly human,” it is important to follow the technological
detours that lead to it, and that, conversely, to understand technology, we need to read it as a detour towards the human. In that sense, the meaning of cinema as technology lies in the way it shapes and makes what we call the human possible. Raising the question of cinema as technology thus leads us from the field of film and media theory to that of the philosophy of technology, and from aesthetics to epistemology and anthropology, before we can return to film theory.

In what follows, I want to first recapitulate how Film Studies has addressed the question of technology, both in technological and economic histories of cinema. I will then turn to apparatus theory and what we might call the epistemological paradox of Plato’s cave, i.e. the fact that in addressing technology, film and media theory – or, more specifically, apparatus theory and Kittlerian media theory – appear to be facing a kind of uncertainty principle, according to which we can either focus on technology or meaning, but never on both simultaneously, thus forever missing out on the meaning of cinema as technology. In my final section, I will draw on the philosophy of technology and science and technology studies to propose a resolution of this paradox.

From Cinematic Technique to Cinema as Technology

Cinema is not only the most important technical image medium of the twentieth and twenty-first centuries alongside still photography and television. Cinema counts among the most important advancements in communications and media technology, or technology tout court, of the second half of the nineteenth century – alongside the telephone, the typewriter, the typesetting machine, cheap, industrially produced paper, the automobile, the airplane and dynamite. Film and cultural historians have extensively explored cinema’s relationship to modernity. If we agree with historian John Darwin that “the best test for modernity might be the extent to which, in any given society, resources and people could be mobilized for a task, and redeployed continuously as new needs arose or new pressures were felt,” then we can argue that cinema, a mobile medium of moving images that mobilizes concepts and ideas, and in their wake, goods and people, on a global scale, is indeed a genuinely modern medium. In that sense, recent efforts to expand the scope of cinema studies to include the study of media infrastructures, as well as expansions of cinema history towards a wider archaeology of media, point in the right direction: cinema has a place in a broader history of modern logistics and communication technologies.
Yet, if we were to compile a list of the most important technological innovations of the last two centuries, only the most ardent cinéphile would dare to rank cinema at, or even near, the top of the list. Film studies was founded on an emotional bond known as cinephilia. Film scholars, with a confidence that only love can inspire, routinely overestimate the overall importance of their object of study. More sober minds would probably choose the computer instead. This is quite understandable, particularly if you consider how information technology has changed not only the way we work, but also the way we live over the last twenty years. But then, as the Czech-Canadian historian of technology Vaclav Smil argues, the most important innovation of the twentieth century is not the computer at all. Rather, it is the Ammonium-Nitrate synthesis, i.e. industrially produced artificial fertilizer, invented by the Jewish German chemist and Nobel laureate Fritz Haber with Carl Bosch.9 Malthus' most dire predictions would have been proven right in the twentieth century without the benefits of the Haber-Bosch synthesis. We would only be able to feed one billion people, rather than seven billion and counting. If we hold on to the notion that not letting people starve is important, then being able to use ammonium nitrate is, relatively speaking, of more value than owning the latest version of the iPad.

Cinema, as an isolated technology, is even more insignificant by comparison than the computer. Nonetheless, cinema represents a paradigmatic case of technological innovation. Like the automobile, the cinema is an assemblage, a recombination of preexisting technologies. A film projector combines photography on a celluloid support with the light bulb, lenses and a mechanical transportation system borrowing and refining elements from textile industry technology; a film camera combines the same elements, relying on natural or artificial pro-filmic light sources in the place of the light bulb. As George Steiner argues for artistic creation, "all human constructs are combinatorial": “Performative novelties – acrylic paint, the neon tube, the saxophone in its time, electronic music today – obscure this fundamental truth. What they ‘make new’ is the old recombined, differently hybrid.”10 Similarly, in his ‘Theory of Economic Development’, Joseph Schumpeter distinguishes between five types of innovation – the creation of new goods, new methods of production, new markets, new sources of raw materials and new modes of organization – all of which are essentially re-combinations of pre-existing elements.11 The innovation of cinema starts off with the creation of new goods – the experience of motions pictures – and new methods of production.12 Roughly a decade after the first two steps, the creation of new markets and new modes of organization
pave the way for cinema's transition to a major industry. Technology is the driving force at the outset and remains a key element throughout the later steps of cinema's innovation process.

From a point of view of business history, cinema history can be divided into three main periods:

– From 1894-1895 to the early 1910s, cinema is primarily a technology industry, focused on the development and exploitation of patents for cameras, projectors and various other elements of moving image technology. The creation of new products and new methods of organization constitutes innovation in this period. Prior to the World War I, two French technology corporations, Pathé and Gaumont dominate the world market and fight it out with their competitors in North American markets, with Pathé joining the Trust in 1908, a short-lived joint corporation of former competitors with the aim of exploiting a pool of patents to the benefit of all members.

– From 1907 onwards, screenings in dedicated spaces such as nickelodeons replace ambulatory modes of exhibition as the default form of cinematic spectacle. In the following years, the consumption of footage soars, particularly with the passage to the feature film as the standard format of film production and distribution and the passage to large movie palaces as the default mode of exhibition, indicating an exponential growth in the production of films. The creation of dedicated screening venues thus leads to the discovery of new markets. Yet, the main focus of business activity in the film industry shifts from technology not to film production, but to real estate, i.e. to owning and running exhibition facilities. The control of real estate paves the way for the film industry's transition to big business via an 'escalation of quality' (Bakker), with movie theaters serving as collateral for the bank loans needed to pay for the soaring production and distribution cost of feature films. As a consequence, both in terms of its financial and organizational patterns, the film industry of the classical Hollywood period operates as a cinema industry, with the combination of the control of downtown first run theaters and national and international distribution networks securing control of the market for the major studios. More than 90 per cent of all investments in the American film industry from the mid-1910s through the late 1940s are in real estate; the headquarters of the main film corporations are all in New York, from where 70 per cent of movie theaters then operating in the US can be reached with a local phone call; and the so-called Hollywood studios basically operate as subcontractors for large cinema chains. The transition from the early
phase of dedicated screening venues to the major Hollywood studios is mostly a matter of the creation of new forms of organization.

– When the Paramount Consent Decree from 1948 forces the major film corporations to divest, they chose to get out of the real estate business and sell of their cinema chains, retaining their production facilities and distribution arms instead. Thus, the film industry becomes a copyright industry, shifting its focus from the ownership and operation of exhibition facilities to the production and exploitation of copyrighted materials. Some studios re-entered the cinema market with partial ownership agreements in cinema chains after the Reagan administration signalled that it would no longer enforce the Paramount Decree in the 1980s. Others, like Columbia, which is a subsidiary of Sony, and Universal, which was, for a time in the 1990s, a subsidiary of Matsushita, sought synergies with technology corporations, reinstating the pre-World War I Pathé model on a larger scale. As the fate of the Matsushita-Universal alliance shows, the results were mostly disappointing. The core business of the film industry is now the production of films, i.e. copyrighted material with a potentially unlimited commercial lifespan and territorial reach. Over the last four decades, the copyright industry model has been very successful largely because the creation of new screening and distribution technologies, from the VCR to DVD and streaming, has in turn led to the creation of new markets, to the point where theatrical revenue now makes up only about 25 per cent of the revenue of an average Hollywood film, with the rest coming from so-called ancillary markets, i.e. subsequent release windows.

Throughout this history, the basic recording and delivery technologies for moving images remain remarkably stable. 35mm, the format favored by Edison, became the world standard with advent of dedicated screening venues at the end of the 1900s both in the US and in Europe. Twenty-four frames per second became the standard rate of projection throughout the world with the introduction of sound. 35mm at 24 frames per section proved to be one of the most durable technological standards in communication technology until it was phased out and replaced by digital projection in the 2010s. Digital cameras were modeled on the 24 per second frame rate when they were first developed in the 1990s and early 2000s to accord with the then-still dominant format of distribution, the 35mm/24 frames per second film print. Most technological advancements throughout cinema’s history, from widescreen formats to stereo, Dolby and Dolby surround sound
systems and, more recently, CGI and 3D technologies, left the recording and delivery standard of 35mm/24 frames per second unaltered. In that sense, they remained secondary to the basic technology of cinema, and the most important innovations after the introduction of sound were organizational rather than technological. This pertains even to home video technologies, which remained secondary to the recording and delivery standard in the sense that they served mostly as delivery technologies operating with reduction formats and transpositions of 35mm prints. Much like the automotive industry, which has largely relied on the mass production of some combination of internal combustion engine and a four-wheel chassis for the last one hundred years, cinema has operated with a relatively stable technological infrastructure for most of its history.

But if the infrastructure has been stable, and if technology is indeed, as André Bazin suggests, the infrastructure of cinema, the secondary innovations of cinema technology – sound, color, formats, optics, special effects – had an enormous impact on the development of cinema as an art form. “Every change of real importance,” Bazin argues, “which enriches our cinematic heritage” (i.e. that enriches the history of film as an art form) is indeed “tied to technology.” Cinema as an art form is thoroughly technological. You can draw without a paper or a pencil, you can make music without an instrument, you can dance without shoes, but you cannot make and show a film without a camera and a projector. Even Alexander McCall’s ‘Light Describing a Cone’ needs a projector. Accordingly, as much as any historian of art has to address the question of technique and specify whether a given work of art is executed in oil, by pencil, on paper, on canvas, etc., any historian of cinema as an art form needs to address technique, which involves a discussion of cinema’s technologies. And this is indeed the main aspect under which cinema technology has been analyzed in the field of film studies: Under the aspect of technology as technique.

Film studies was first established as an interdisciplinary field of study dedicated to the analysis of the aesthetic properties, psychological dynamics and social effects of cinema after World War II in France under the title of ‘Filmology’. Powered by the prestige of its founders, which included the dean of French aesthetics, Etienne Souriau, and Henri Wallon, one of the key figures of developmental psychology, filmology established itself at the intersection of philosophy, psychology, and sociology. Despite what turned out to be a series of lasting conceptual contributions to film theory, filmology was transformed by the onslaught of television in the late 1950s and morphed into a form of communication studies focused on TV in the
early 1960s, itself a victim, if you will, of technological innovation. Yet, in the research designs of filmology, the question of technology played at best a marginal role. Issues of technology were discussed in a few articles published in the *Revue internationale de filmologie*, such as a study on the difference between the cinematic and televisual images by Henri Dieuziéde, which discussed the specifics of cathode ray tubes and its perceptual and aesthetic properties during broadcasts of theatrical films. When film studies finally emerged as a discipline out of literature departments in the 1960s and 1970s, it primarily focused on film as art and dealt with cinema as a canon of great works bound together by relationships of influence. While works such as Karel Reisz' *The Technique of Film Editing*, which was first published in 1953 and revised in 1968, discussed montage and other aspects of film making as a craft, and while the classics of film theory, from Eisenstein to Epstein, were written by film makers dealing theorizing their artistic practice, cinema technology only became a central concern of film studies within the framework of the “new film history” in the 1970s. The point of David Bordwell's 'historical poetics of film', for instance, was that in order to properly understand a film, one had to be familiar with the techniques employed in its production or creation. Expanding on an understanding of technology as technique established in art history and borrowing from the methodologies of the history of technology, the research paradigm proved to be enormously productive, yielding comprehensive histories of sound, lighting, color, widescreen formats, and digital effects. And while the history of non-linear editing, for instance, remains as yet to be written, it is safe to assume that the paradigm will continue to be productive.

As I argued in the introduction, Kubrick's cut not only creates meaning, but also points to the hand that made it. Cinema technology is about more than its impact on the history of film style. In the introduction to his 1923 work, 'Visible Man', Béla Balázs celebrated the advent of cinema as the dawn of a new 'visual culture' that would do away with the abstractions of print culture, and reverse its harmful spiritual fragmentation. In a different vein, but with a similar grand gesture and sense of history, André Bazin argued in 'The Myth of Total Cinema' that the cinema that we know was merely a transitory technological manifestation of a dream of immersion, which would be perfected as cinema's history went on. Bazin's claim that technology is the infrastructure of cinema can be read to mean that technology shapes technique and, with it, the style and meaning of individual films. But it can also mean that technology contains the meaning of cinema.
Plato’s Uncertainty Principle

Technology only became a focus of film studies relatively late, despite the fact that in its first decade, the film industry was a technology industry, and despite the fact that in cinema, style and technique are even more intricately related to technology than in other art forms. This should not surprise us, however. As Bruno Latour argues about technology in general, “once the invention has become an innovation as a result of the slow concretization which is demanded by industry and the market, we end up by being able to count on a unity of action which is so reliable that it becomes invisible.”31 Apple products may be the paradigmatic case of an innovation that obfuscates the invention that made it possible. Their design allows for an intuitive grasp of the device’s performance functions without reflecting anything of the underlying unity of action.

The difficulty appears to be further compounded by the fact that the “tools always presuppose a machine, and the machine is social before it is technical” as Jean-Louis Comolli famously argues in his influential essay on the ‘Machines of the Visible’, first published in the Cahiers du Cinéma in 1971. With more than a passing echo of Bazin’s ‘Myth of total cinema’, Comolli claims that the cinema is “born immediately as a social machine, and thus not from the sole invention of it equipment,” but from “the anticipation of its social profitability.” For Comolli, it is “the spectators who invent the cinema”32 Cinema is born from a “frenzy of the visible” in the second half of the nineteenth century, which is an “effect of the social multiplication of images” and the spatial and geographical extension of the field of vision. The social multiplication of images in turn presupposes the technologies of photography and of printing, of course. But in Comolli’s view, technology has no agency, since the “machine is social before it is technical.” The social neutralizes the technical: The “frenzy of the visible” marshals technology, but only enlists it as technique. Or, to put it differently, the “frenzy of the visible” consigns technology to the invisible.

But as Latour argues, the apparent invisibility of technology is, in itself “of course, a kind of optical illusion.”33 What if, in fact, the machine is technical before it is social, or what if it is both technical and social at the same time? What, for instance, if the cinema invents its spectators, rather than the other way around? Tales of spectators spooked by life-like representations in paintings abound since antiquity. The story of the spectators, who supposedly ran away from the train at the first screening of ‘Entrée d’un train dans la gare de la Ciotat’, has a long pedigree. The story is, in fact, a myth, which only appeared about ten years after the first public screening of
Lumière films in Paris. It finds an echo in the so-called rube films, i.e. films in which a naïve spectator falls prey to illusionist powers of cinema, which appear around the same time.\textsuperscript{34} In a kind of deferred action, the story, like the rube films, served to retroactively underscore the novelty of cinema and highlight the fact that it was unlike any other art or medium available at the time. To put it in Comolli’s terms, the ‘founding myth’ of cinema, as Martin Loiperdinger and Bernd Elzer call the story, tells a tale of spectators who are not at all prepared to reap the benefits of the social profitability of the new invention. Sometimes, it would seem, the tools build the machine, or exceed the machine that presupposes them. Following Latour’s lead, one could speculate that the ‘the founding myth of cinema’ marks the precise moment when the invention of cinema turns into an innovation, i.e. the moment when a majority of spectators have learned to be “able to count on a unity of action which is so reliable that it becomes invisible.”

While Comolli forcefully stresses the primacy of the social over the technical, the question of the balance of the social and the technical haunts the so-called apparatus theory of the 1970s in other quarters as well. In an essay entitled ‘Ideological Effects of the Basic Cinematographic Apparatus’, first published in French in 1970, one year before Comolli’s ‘Machines of the Visible’, and translated into English in 1974, French writer and film theorist Jean-Louis Baudry introduced three metaphors or models for cinema that largely set the terms for the debate in film theory for the next two decades: Freud’s concept of the psychic apparatus, Lacan’s mirror stage and Plato’s cave.

Having invoked Freud’s concept of the psychic apparatus in the essay’s title, Baudry cites Plato’s allegory of the cave, which Socrates introduces in \textit{The Republic} (514a-520a) to discuss the “effect of education and the lack of it in our nature,” in a half-sentence in Baudry’s essay, which, in turn, immediately precedes the author’s introduction of Lacan’s mirror stage:

\begin{quote}
The arrangement of the different elements – projector, darkened hall, screen – in addition to reproducing in a striking way the mise-en-scene of Plato’s cave (prototypical set for all transcendence and the topological model of idealism) reconstructs the situation necessary to the release of the «mirror stage» discovered by Lacan.\textsuperscript{35}
\end{quote}

The first thing to note about this passage is that Lacan did not discover the mirror stage. Henri Wallon did, the French developmental psychologist who was, as mentioned above, a key figure of the Filmology movement in the late 1940s. Wallon first described the process in which a child, placed
in front of a mirror, “gradually comes to distinguish his own body from
its reflected image,” in 1931, five years before Lacan published his famous
paper. Elisabeth Rudinesco, a historian of psychoanalysis and biographer of
Lacan, argues that Wallon’s contribution has become part of an “obliterated
archive” of the various historical layers of the concept of the mirror stage. Yet,
at some point, some concepts take on a life of their own, sometimes
because they explain almost too much. One of the standard protocols of
scientific research progresses from description to analysis and explanation:
the researcher defines an object of study according to the terms of her
research design, proceeds to analyze the object in terms of its component
elements and functional logic, and develops a theory to explain the phenom-
emon. The definition of the object of study, however, depends on theoretical
assumptions that are already part of the research design, as well as on
certain “styles of thought” and the social logic of “thought collectives,” as
Ludwig Fleck proposes to call it. In the humanities, which I would contend
operate much more along similar lines as the natural sciences in terms of
“styles of thought” and “thought collectives” than we generally assume,
certain theoretical concepts come to define and dominate entire research
paradigms over certain time periods. Such concepts operate not only as
standard assumptions baked into research designs, but tend to reverse
the procedural flow from description to analysis and explanation, to the
point where the theoretical explanation takes precedence over the object.
One could argue that the concept of ‘mirror neurons’ was one the latest
eamples of a theory that took on a life of its own as an explanation in search
of an object. Lacan’s concept of the mirror stage, however, found much
greater resonance, and its career in the humanities would provide ample
material for a historical study. Baudry’s essay marks the point of entry of
Lacan’s concept into film theory. Baudry combines the mirror stage with
the Freudian concept of the apparatus and Plato’s cave to create a heuristic
that promises to unlock the psychological and, by extension, ideological
dynamics of cinema. The common thread that unites the three models
and metaphors is that in all three, the element of technology provides the
template that explains cinema: the technical metaphor of the apparatus
in Freud, the device of the mirror in Lacan, and the machinery to project
shadows on the cave’s wall in Plato. In that sense, the balance of object and
theory, or phenomenon and explanation, in Baudry’s toolbox, hangs on
the question of technology. Or, to put it differently, rather than assuming
a subordinate role in a pre-existing social machine, technology seems to
provide the pivot around which the explanation of the dynamics of the
social machine evolves.
Freud first introduces the technical metaphor of the “apparatus” in his ‘Entwurf einer Psychologie’ from 1895, to describe a key juncture of the neuronal processes in the perceptual system. In the seventh chapter of the Interpretation of Dreams from 1900, the term “psychic apparatus” describes the overall unit of the three systems of consciousness, pre-consciousness, and sub-consciousness. The articulation and functional interaction of these three systems allows Freud to locate any given psychological event topically, i.e. with regards to the location in the apparatus where the event primarily takes place; dynamically, i.e. as a form of conflict, usually between conscious norms and subconscious desires; and energetically, i.e. in terms of the “psychic energy” mobilized in and for the event. This meta-psychological model of the human psyche as apparatus, as a machine powered by psychic energy, allows the therapist to operate as a mechanic of latent meaning, analyzing the output of the machine – dreams, hallucinations, jokes, slips and all kinds of symptoms – in terms of the mechanisms and dynamics of their production, in particular displacement, transfer, condensation. And while the various outputs of the machine may not make sense on the surface – what makes them interesting, in fact, is precisely the way in which they are often aggressively nonsensical and subvert the established order of meaning – the work of the mechanic of latent meaning is aided by the fact that the subconscious is fully determinate, as Freud argues: Every bit of superficial nonsense can be counted on to be an expression, however creatively contorted, of a perfectly coherent latent meaning.

What makes Freud’s model attractive for film theorists is the way in which psychic production interacts with perception. In the psychic apparatus, perception is a flow of information from consciousness to sub-consciousness, while hallucination and dream in particular appear as a form of psychic projection from the sub-conscious to conscious system. Perception is topical progression, psychic production is topical regression, i.e. a reversal of the flow of information, meaning and energy inside the psychic apparatus. In that sense, the psychic apparatus, like the cinema, is an arrangement of elements designed for heightened perception and the production of multi-layered meanings by means of projection. Hence, the cinema, in analogy to the psyche, may be described as a cinematic apparatus.

The analogy between Freud’s psychic apparatus and the projection apparatus of cinema may have been apparent to an earlier generation of film critics and film theorists versed in psychoanalysis. Writing in the late 1940s and early 1950s, Cesare Musatti, the pioneer of Freudian psychoanalysis in Italy, was the first theorist to fully explore the analogy of
But it was the political turn of film theory in the early 1970s that brought the potential of Freud’s concept of the apparatus to the fore. To film theorists like Baudry, the analogy between psychic and cinematic apparatus promised to bequeath to film theory the full heuristic fecundity and critical incisiveness of Freud’s theory of the dynamic interaction between subconscious desires and social norms. If dreams, jokes, slips and symptoms could be understood as compromises between desires and norms by analyzing the workings of the psychic apparatus, then surely the ideological compromises of cinema could be understood by analyzing the operations of the cinematic apparatus. In other words, the analogy promised to offer a critical handle and a sophisticated methodology for the analysis of the “ideological effects” of cinema.

Lacan’s 1936 essay ‘The Mirror Stage as Formative of the Function of the I’ carried a similar promise at the point of Baudry’s writing. For Lacan, the toddler’s discovery of her mirror image is the foundational moment of identity formation: From the recognition of the mirror image, personal identity emerges as an imaginary relationship to a structurally elusive reflection of oneself, forever scarred by a fundamental rift, which in itself is beyond representation. Again, by analogy, the mirror stage provided a model for the cinema spectator’s imaginary relationship to the characters on screen. As in the case of the psychic apparatus, the analogy serves not only a heuristic and explanatory purpose. It also has an experiential dimension. The cinematic apparatus sets in motion a topic regression in the psychic apparatus, which leads the spectator to treat the image on the screen as a “hallucination coming from the outside,” a “hallucination d’autrui,” as Christian Metz called it. But, in order for the topic regression to occur, the spectator must be positioned in a semi-somnabulic position, a position of “sous-motricité et sur-perception,” of reduced motility and heightened perception, just like the toddler in front of the mirror. The experience of cinema is not only analogous to the experience of the mirror stage, it builds on a reiteration of that experience. As Baudry writes, the “arrangement of elements” of projector, screen and cinema hall “reconstructs the situation necessary to release” the mirror stage. Through an operation not of topical, but of genealogical regression, i.e. a temporary regression to the mirror-stage of our individual psychological history, the cinematic apparatus induces us to re-live the euphoria of the discovery of the image of the self in the mirror, reiterating and re-entrapping us in the imaginary fullness of our relationship to ourselves, while deferring the affective charge of that fullness onto our relationship to the characters on screen. Like the mirror, the toddler and the mother holding her up to the mirror image and
confirming her identification of her reflection with herself, the projector, the hall and the screen form a “dispositive”, an arrangement of technologies with psychological dispositions to produce certain mental effects.

With a term from French anthropologist André Leroi-Gourhan, the “arrangement of elements” that reconstruct the situation necessary to “release” the mirror stage can be described as a “chaîne opératoire,” an operational sequence of technologies and social acts in the production of artifacts. Operational sequences are programs that “are organized in sequences of stereotyped gestures whose repetition ensures the individual’s normal balance within the social environment and his or her own psychological comfort within the group.” In the case of cinema, the artifacts are the fleeting mental effects produced by the apparatus. Through recursion and reiteration, these ephemeral effects gain the consistency of patterns, to the point of “securing the individual’s integration in society,” which depends “upon the smooth performance of these operational sequence in normal life.”

To the extent that cinema technology provides the basis for the “smooth performance” of the operational sequence and helps to secure “the individual’s integration in society,” the analysis of the technological base of cinema is part of a critique of ideology.

As if the model of the psychic apparatus and the operational sequence of the mirror setting were not enough, Baudry adds Plato’s Cave to his box of analytical tools.

If the arrangement of projector, hall and screen “reconstructs the situation necessary to the release of the ‘mirror stage’ discovered by Lacan,” Baudry writes, it does so “in addition to reproducing in a striking way the mise-en-scene of Plato’s cave.” The cinematic apparatus as an extension of the psychic apparatus offers to the film theorist a way to disentangle the complex relationship between the mechanics of desire and the production of meaning in cinema. The cinematic apparatus as a device of restaging and “releasing” the mirror stage provides a handle on the genealogy of cinematic subjectivity. Adding yet another layer of analysis, Plato’s Cave highlights for Baudry how cinema is complicit in perpetuating transcendentalist and idealist epistemologies. According to Baudry, Plato’s Cave is the “prototypical set for all transcendence and the topological model of idealism.” The mirror stage provides a key to the genealogy of (cinematic) subjectivity; Plato’s Cave provides a model for a fully formed version of that subjectivity. If modern philosophy from Descartes to Husserl posits the transcendental subject as the foundation of knowledge, the analogy between cinema and Plato’s cave reveals how cinema is complicit in perpetuating transcendentalist and idealist epistemologies of the subject, and thus an ideology of the sovereign
gaze as the nadir of the world. Accordingly, the task of the critical film theorist is to lead the spectator out of the cave and reveal the dispositive that held her in its thrall.

Pointing to the technological base of cinema, then, is the critical gesture par excellence of the early 1970s, both in the film theory and in film practice. As Peter Wollen pointed out at the time, there was a debate whether Godard’s Brechtian gestures of showing the apparatus should count as a radical critique, or whether only the anti-illusionist aesthetics of structural film and similar forms of experimental cinema deserved that label. But far from stressing the primacy of the social machine over technology, both avant-gardes and Baudry’s strain of apparatus theory operate on the assumption that the best way to deconstruct the social machine is to point to the agency of technology.

Along similar lines, German media theory, as it emerged with Friedrich Kittler’s two books *Discourse Networks 1800-1900* (1985) and *Gramophone, Film, Typewriter* (1986) roughly ten years after apparatus theory, argues that what really matters in communication is its materiality. Moving on from eighteenth- and nineteenth-century literature and late nineteenth-century communication technology in the late 1980s, Kittler ultimately focuses on the computer and proposes a grand narrative, which we can sum up as ‘Techno-Hegelianism’. It is a philosophy of history in which Hegel is not only turned from his head to his feet, but in which the feet are replaced with the Heideggerian ‘Gestell der Technik’. Taking the place of Hegel’s spirit, media technology moves history forward, and the computer, the medium which can represent every other medium in binary code, is the hardware equivalent of the Hegelian ‘Weltgeist’.

In terms of its analytical approach, however, Kittlerian media theory remains firmly anchored within the framework of Plato’s cave. Further exacerbating the tension between the technical base and its illusionary effect, Kittlerian media theory operates under the assumption of what we may call Plato’s uncertainty principle: You can either have the cave, or leave it, i.e. you can either fixate on the illusionary effects of the dispositive or focus on the dispositive, but you cannot have both at the same time. You cannot have the cave and leave it too. For Kittler and his followers, prudence dictates a focus on hardware rather than software. As a consequence, Kittlerian media theory and media archaeology has largely focused on hardware histories rather than modes of expression and histories of form for the last three decades.

As for film theory and critical film practice, the social machine of cinema proved to be quite resistant to their impact. Brechtian reflexivity and the anti-illusionist aesthetic of experimental cinema quickly became markers
of style, rather than effective political strategies, and apparatus theory was eventually superseded, among others, by Deleuzian film theory. Deleuze offered a critique psycho-semiotic film theory and the inherent transcendentalism of the Lacanian concept of the gaze, which he proposed to replace with the immanence of the image, an offer which a new generation of film theorists gladly accepted.

From a Kitterlerian point of view, one could argue that the relative political failure of the two avant-gardes and apparatus theory serves to underscore the pertinence of Plato's uncertainty principle. Revelations of the apparatus in film remain on the side of the illusionary effects of the apparatus, and one would have to do away with film altogether, as Kittler does in *Gramophone, Film, Typewriter*, which is not at all a book about cinema, in order to really leave the cave. From a psychoanalytic point of view, on the other hand, one could argue that Plato's uncertainty principle can be accommodated, and resolved, in a structure of ‘Verneinung’, of negation: We can, in fact, simultaneously acknowledge and deny the apparatus; we can know about the apparatus and still fall prey to its illusionary effects. Through the logic of negation, we can have the cave and leave it, too. In fact, revealing the apparatus seems to strengthen, rather than break, the power of cinematic illusion. It is no coincidence that ‘making of’ films first appear in the early 1910s, at the point of what Tom Gunning proposes to call ‘narrative integration’, i.e. the creation of closed, coherent fictional worlds in narrative cinema. Rather than offer a radical critique of the apparatus, Brechtian gestures of reflexivity appear to share an operational logic with ‘making of’ films.

In terms of our understanding of cinema as technology, however, both Plato's uncertainty principle and the logic of negation lead into an aporia: While Plato's uncertainty principle forces us to choose between technology and cinema, negation plays out as a ‘Fort-Da-Spiel’ of sorts, a constant oscillation between illusion and revelation. Neither of which, in theoretical terms, are entirely satisfactory explanations of cinema as technology.

In order to move beyond a merely instrumental conception of cinema's technological infrastructure, as well beyond the conundrums of both Plato's uncertainty principle and the logic of negation, we can draw on some insights from the philosophy of technology.

**Cinema and the Body Envy of Artificial Intelligence**

Technology impact assessment is one of the main areas of the philosophy of technology. Developed largely in response to the emergence of nuclear
technology in the wake of World War II, technology impact assessment evaluates what it means, both pragmatically and ethically, to live with technologies with the potential to transform human existence. Far from assuming that a new technology is merely a tool of a pre-existing social machine, then, technology impact assessment assumes that new technologies may have an agency of their own, with an impact on human existence that may well exceed their stated purpose. Heidegger’s notion of technology as ‘Entbergung’, of techne as a progressive unconcealment of physis, can be read in the same context. Heidegger argues that, far from merely being a tool, technology transforms the world by imposing a worldview dominated by question of utility and utilization. Yet, quoting Hölderlin’s line “Wo aber Gefahr ist, wächst das Rettende auch” (Where the danger is, the saving powers will grow as well), Heidegger suggests that there is no outside to technology, from which it can be contained and brought under control. Rather, the saving powers must come from within the ‘Gestell’ of technology. Philosophical argument can take many forms. Literature is among them, as Diderot’s Jacques le Fataliste et son Maitre and other eighteenth-century French works of philosophy illustrate. A case can be made that cinema, too, can carry forward a philosophical argument, and particularly an argument about technology. For instance, we can argue that films like Kubrick’s 2001, Spielberg’s Artificial Intelligence (2001) or more recently Spike Jonze’s Her (2013), engage in a kind of technology impact assessment which takes the form of casuistic narratives. Taking the case of a man who writes love letters for a living, for instance, Her explores what it means to fall in love with an operating system, while Artificial Intelligence tells the story of a humanoid, who develops a desire to become human, while the protagonist of 2001 is a computer who takes over a space mission and turns into a mortal threat for the crew. All three narratives are driven by, and are about, the agency of technology, and they share another common thread: In all three narratives, the artificial intelligence units develop what we might call body envy, i.e. a desire for the embodied existence of human beings. Precisely at the point where it assumes autonomous agency in its most anthropomorphous shape, namely as artificial intelligence, technology projects itself back unto its creators. Highlighting its autonomous agency as well its limitations, the projective bond to embodied human existence defines technology.

This projective bond exactly mirrors one of the main concerns of the philosophy of technology since the nineteenth century. Philosophers from Ernst Kapp to Gilbert Simondon and Bruno Latour, along with paleoanthropologists such as John F. Hoffecker, have argued that what we call ‘human’ cannot be thought independently of technology, and that the human
Actually emerges from technology, its development and acquisition. Other thinkers have defined technologies either as supplements and substitutes that compensate for a genetic, structural lack in human beings (the so-called theory of the *Mängelwesen*; Freud, Gehlen), or as ‘extensions of man’ that enhance a pre-existing repertoire of what it means to be a human being (McLuhan). Whether they define technology as supplement or extension, the argument assumes a pre-existing human nature, to which technology is an add-on, serving pre-existing human ends, or making possible the attainment of human ends that would not be attainable without them. However, as Derrida argued, the supplement is always more than merely an add-on. Rather, it is intricately tied to and determines that to which it is a supplement. In a similar reversal of the hierarchy of supplement and supplemented, thinkers like Kapp argue that tools and technology are essential, rather than accidental, to humanity. Kapp’s notion of technology as ‘organ projection’, for instance, suggests that a tool is not merely an extension or a substitute. Rather, it carries with it an unconscious knowledge about what a human being is and can be, a knowledge that becomes conscious, and, in fact, turns into a driver of self-consciousness, through usage of the tool and reflection on its properties. Similarly, and drawing on Kapp, Hoffecker argues that the emergence of the human mind is closely tied to the development of tools. From the fossil record, Hoffecker infers that technology, rather than language and symbols, “is the means by which the mind engages the external world” and that tools are “externalized thoughts,” i.e. mental (rather than just organ) projections. It is important to note that neither Kapp, nor Hoffecker engage in technological determinism. For Hoffecker, technology does not determine the human. Nor is man just a tool-making animal, a definition inherited from antiquity, which no longer holds in the light of recent insights into learning and group knowledge in non-human primates anyways. Rather, what constitutes the ‘properly human’ is the capacity to shape technology through a process of infinite recombination of pre-existing elements.

As we have seen, cinema is an exemplary case of the recombination of pre-existing elements. The question is what kind of a detour to the properly human cinema is, and of what, if anything, it is a projection. As argued above, what I propose to call the body envy of the artificial intelligence units in 2001, *AI* and *Her*, mirrors the projective bond stipulated by Kapp and others. Certainly, in those films agency of technology cannot be understood, and, in fact, technology cannot understand itself, independently of human existence. But, I would argue the body envy of the AI units offers a clue for an understanding of cinema as technology more generally speaking.
While Deleuze’s critique of apparatus theory focused on the continuing transcendentalism of semio-psychoanalytical film theory, another powerful critique of the then dominant paradigm of film theory in the early 1990s focused on embodiment and experience. In the introduction to The Address of the Eye. A Phenomenology of Film Experience from 1992, Vivian Sobchack explicitly positions herself against apparatus theory, arguing that Lacanian accounts miss out on the lived-body experience of cinema. More recently, drawing on Sobchack and philosophical aesthetics, Christiane Voss proposed the concept of the spectator as ‘Leihkörper’, or surrogate body of film. While Sobchack argues that the film has a body of its own, Voss refines the argument and suggests that the film embodies itself in the body of the spectator, which thus becomes the surrogate or ‘loan’ body of the film. Rather than the mirror stage or Plato’s cave, the scene in Her, in which the artificial intelligence unit wants to make love to the protagonist and hires a female human stand-in as a surrogate body, would provide a metaphor or model for the cinema. And it is precisely the failure of that experiment, the ‘rendez-vous manqué’ between the two bodies, which speaks to the connection between human existence and cinema as technology. Where Christian Metz speaks of a ‘rendez-vous manqué’ between the voyeur and the exhibitionist, the actual ‘rendez-vous’ of cinema – which is both ‘manqué’ and successful, and which is successful to the extent that it never succeeds entirely – is that between the spectator and the technology of film, onto which, and into which, the spectator projects her body. In that sense, the spectators of the founding myth of cinema fail to understand that the film only wants to temporarily lodge itself, and not attack their bodies, and the rubes of the ‘rube films’ fail to understand that the body on screen is not another body, but a technological projection of their own.

Neither Sobchack, nor Voss address the question of technology directly. However, their arguments offer a framework that allows us to think of cinema itself as a form of artificial intelligence, a technological unit, which engages us through a projective bond. In his short 1940 novel The Invention of Morel, which was one of the main inspirations for Alain Resnais’ and Alain Robbe-Grillet’s L’année dernière à Marienbad, Adolfo Bioy Casares imagines an island inhabited by people who turned out to be filmed recordings of themselves at a given moment in their life’s history. The entire island is an ingenious mechanism of projection, built to sustain itself autonomously on natural resources. The protagonist ends up on the island by accident. Enthralled by the projections, he falls in love with a woman, almost loses his mind over her lack of responsiveness and the sense of being trapped in an eternal loop of past experience, and ends up destroying the entire
mechanism. Biyo Casares, in other words, develops the uncanny scenario of cinema as a technology with truly autonomous agency, a cinema without address, in which the spectator has no place. It is a scenario, which helps us understand cinema as technology by marking the opposite pole of an understanding of cinema in which technology has no agency. In between a cinema, in which the social comes before the technical and in which technology is merely the tool of a pre-existing social machine, and a cinema which acts autonomously and has no place for the spectator, lies a cinema in which the projected body on the screen is the technological detour through which the properly human comes into existence.

Notes

1. See also the contribution of Benoît Turquety in this volume.
2. For the concept of technical image, see Vilém Flusser, Into the Universe of Technical Images (Minneapolis, MN: Minnesota University Press, 2011).
6. Charney and Schwartz, Cinema and the Invention of Modern Life; Casetti, Eye of the Century; Hansen, Babel and Babylon; Singer, Melodrama and Modernity.
7. Darwin, After Tamerlane, 27.
8. Parks and Starosielski, Signal Traffic; Starosielski, The Undersea Network; Thomas Elsaesser. Film History as Media Archaeology.
9. Smil, Enriching the Earth.
10. Steiner, Grammars of Creation, 156.
12. See also Turquety, Benoît. Inventer le cinéma. Épistémologie: problèmes, machines (Lausanne: L’Âge d’homme, 2014).
15. Vogel, Entertainment Industry Economics.
16. Belton, ‘The Origins of 35mm Film as Standard’.
20. Albera and Lefebvre, La filmologie.
21. Dieuzeide, ‘Quelques problèmes’.
22. Reisz, The Technique of Film Editing.
24. Weis and Belton, Film Sound.
27. Flückiger, Visual Effects.
29. Balázs, Early Film Theory.
34. Loiperding and Elzer, ‘Lumière’s Arrival of the Train’.
38. Fleck, Entstehung und Entwicklung einer wissenschaftlichen Tatsache.
40. Epplensteiner and Sierek, Der Analytiker im Kino.
41. Musatti, Psicoanalisi e vita contemporanea; Musatti, Scritti sul cinema.
43. Metz, ‘Le film de fiction et son spectateur’.
44. Leroi-Gourhan, Gesture and Speech, 232.
45. Wollen, ‘The Two Avant-Gardes’.
46. Kittler, Discourse Networks.
47. Kittler, Gramophone, Film, Typewriter.
48. The most radical proponent of this line of thinking is Wolfgang Ernst and his ‘materialist diagrammatics’ approach to media archaeology.
49. Mannoni, Clefs pour l’imaginaire.
53. Werner, ‘Diderot’s Great Scroll’.
57. Hoffercker, Landscape of the Mind.
58. Derrida, Of Grammatology.
59. Hoffercker, Landscape of the Mind, 23.
60. Ibid., 7.
63. Metz, ‘Le signifiant imaginaire’.
64. Bioy Casares, The Invention of Morel.

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