

DEUS EX MACHINA
THE MYTH OF COMPLETE REPRESENTATION

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“But, if we know that we are directors of being, we also know that we are not its producers.”
Jean-Paul Sartre, *What Is Literature?*

Perhaps there is some prophetic wisdom in Louis Lumiere’s often-mocked notion that, “the cinema is an invention without a future.” In *The Myth of Total Cinema*, André Bazin provides the tentative logic for this by reasoning that the true origins of the medium reside in an ideal – “a total and complete representation of reality”ⁱ – rather than in any technical innovation that followed from this aim. As such, “every new development added to the cinema must, paradoxically, take it nearer and nearer to its origins. In short, cinema has not yet been invented.”ⁱⁱ So, when Bazin makes the dubious claim that photography and cinema “satisfy, once and for all and in its very essence, our obsession with realism,”ⁱⁱⁱ in *The Ontology of the Photographic Image*, he implicitly situates each existent photograph as a mere proof-of-concept for the whole of photography’s insurmountable premise – a demonstration of the fact that the conveyance of an optical impression can be achieved objectively, even if the image in question does not exemplify the full scope of that ideal. His remark, “Hurrying past the various stopping places, the very first of which materially speaking should have halted them, it was at the very height and summit that most of them were aiming,”^{iv} in *The Myth of Total Cinema* seems to support this conclusion by suggesting that the first proof-of-concept, in a certain way, answers the call to realism as much as any subsequent. This, however, depends upon the propriety of the notion that the total cinema is unachievable in a technical sense – a condition for which Bazin’s argument about the circuitousness of cinema’s developmental history provides no definite proof. But, if there is indeed some natural obstruction to photography’s representational completeness, then it must follow that the progress claimed by any innovation to the medium can only be judged in relation to those before it and not by proximity to its goal.

We must therefore pose the ontological question of what it would mean for a photograph to represent an object in full. According to Charles Peirce’s definition of the term, a photograph holds a primarily *indexical* relation to its object “because it is in dynamical (including spatial)

connection both with the individual object, on one hand, and with the senses or memory of the person for whom it serves as a sign.”^v An index – such as the demonstrative pronoun, ‘this,’ or the act of pointing – literally directs our attention to some object, which must actually exist in order for the representation to be an index of it. In this respect, the photograph provides tangible proof of the object’s appearance by capturing the rays of light cast from it as a record of its effect. Though a perceiver would be required to identify this relationship as an ‘indexical’ one, the connection between object and image is produced regardless of its acknowledgement. Thus, we may surmise that a complete photograph would automatically point to and make record of every facet of the object’s visual appearance.

From the outset, the attainment of this ideal seems to pose an immense challenge as we must reason that every level of the object’s surface structure – from a macroscopic view to an atomic one – is pertinent to the object’s appearance as a whole. Since the area of a surface is infinitely divisible, it appears as though we may always venture further into a subatomic view. From this perspective, a complete indexation would be impossible by virtue of the fact that the object’s form possesses infinite complexity. If this is the case, however, it is irrelevant to our challenge because of certain quantum limitations that prevent the interminable indexation of the object’s complexity. At any scale, an object’s position is determined by illuminating it with photons that are then reflected towards a recording device. In order to target an ever-smaller object, the photons used must have progressively shorter wavelengths, which means they are increasingly energized. At the scale of 1.616×10^{-35} meters – a *Planck length* – the photonic energy required to illuminate a particle would be so great that, in theory, the photon’s collision with the particle would create a miniscule black hole that would consume the photon, making the measurement impossible. For this reason, photography’s indexical capabilities are necessarily limited to the scale of space greater than a Planck length. Below this limit, quantum effects dominate the structure of space and as such we may only conceive of a particle’s appearance in the manner of Schrödinger’s cat. Since we cannot concretely determine the particle’s state to this level of precision, we must conceive of it as occupying each possible state simultaneously. Therefore, if we wish to produce a photograph whose pixel resolution is finer than a Planck length, it is necessary to introduce a process to photography which would otherwise be

characterized as painting: the act of choosing in a non-objective or perhaps arbitrary manner a discreet position for the rendering of a particle.

Even greater complications arise, however, when we try to simultaneously account for every surface of the three-dimensional object. One possible approach to this problem is to situate numerous cameras around the object. But this method cannot produce a singular – let alone complete – image. Rather, the more cameras that are utilized, the less coherent the picture becomes. Since each constituent photograph produces a unique perspectival distortion of the object, which cannot be congruously reconciled with the others, their simultaneous experience must convey a fractured totality. None of these perspectives allows us to infer the object's whole. Nor do any, in themselves, contain the information necessary to determine the relation of the pieces to one another. Rather than creating a unified representation, in such a method the object is rendered as a manifold for the infinite variety of its possible perceivers. Using a holographic technique, it is possible to record each of the constituent perspectives onto a single sheet of photographic emulsion. But since holograms require that the viewer move his or her head to see through each perspective, the theoretically simultaneous accessibility of each can never be experienced as such. Instead, for both holography and photography, the viewer must access the constituent perspectives in temporal succession to blur the transition between each discreet vantage point. If a suitable number of perspectives are presented in rapid sequence, the viewer will naturally infer the geometric relationship between each frame to arrive at a perceptually congruous representation of the whole. The photographs themselves, however, do not explicitly indicate their congruence with one another.

In the narrative of the cinema as a technical trajectory, each successive plot point – the advent of color, stereoscopy, increasingly precise lenses and so on – seems to have brought the tale ever closer to its triumphant resolution in the total cinema. Yet, the very premise driving this story, the effort to resolve the dialectical gap between object and representation, is a flawed one. The photograph is defined by its relation to the object, but this correspondence always remains incomplete, the gap always insurmountable. The further we attempt to extend the ontological premise of photography towards a complete representation, the more uncertain, fractured, and dependent upon a perceiver the image becomes. Therefore, it is not so much that the cinema has

no future, but rather that it is not going anywhere. As Bazin suggests, it is perpetually circling back to its origin in the ideal of the object itself.

Yet, we must wonder whether the achievement of total cinema would really deliver all it seems to promise. In praise of the medium's unique ontology, Bazin claims, "The photographic image is the object itself, the object freed from the conditions of time and space that govern it."^{vi} But this might also be taken as an admission of photography's greatest limitation – the degree to which it can provide an understanding of the object. The photograph, in its hypothetical ideal, directly re-presents the object such that we may inspect it apart from certain restraints of our unmediated experience. By that same token, however, it necessarily lacks any explicit description of the structural context that defines the object's existence. There is a fortuitous suggestion in the name of photography's earliest device, called "camera obscura" or "dark chamber" because rays of light from an object pass through its aperture, cross, and reemerge in a chamber where the light must be much lower than that surrounding the object in order for its image to be seen. That is to say, photography can only elucidate the object so much as it is already lit, and often much less, though it is useful in holding the object's brief flicker for all time so that we may interrogate it using other mechanisms. The medium of photography alone, however, offers no means of interrogation; it does not analyze appearances, but merely records them. It does not provide facts, but only the evidence for them – evidence, which must always be circumstantial in that it relates to only one instance of the object's appearance. A photograph is not the object itself. It is but one manifestation of the object's possible effect, inextricably tied to a single condition of time and space that governed its realization. Therefore, in the pursuit of a viable mode of complete representation, we provisionally turn from the question of whether any photograph may stand for the object's whole to whether it is possible to infer from the manifold of its observed effects a complete description or perfect *iconic* likeness of the structure that produced them.

Though the absence of some particular indexical capability from the imprinting of a photographic image may prohibit the viewer from identifying certain features of the object – a tennis ball's color, e.g. – the camera's ability to record this property merely serves to enable his identification of the ball as "green" but in no way actuates the perception of it as such. Rather, this descriptive term suggests that the object in question conforms to the requirements of a

particular category, which stipulates that its members must – in their interactions with light – only reflect wavelengths within a certain range of the visible spectrum in order to qualify for this designation. Since an infinite number of discreet values exist within this range of wavelengths, however, one might suggest the need for an equally large quantity of terms to describe them. Having an infinite variety of terms to describe all possible characteristics would, of course, be a practical deterrence to communication. Consequently, description must rely upon the use of generalized categories, which are derived from the identification of some similarity between each instance, or alternately, through the ignoring of their differences. This allows the interpreter to conjure some image of what is being represented without needing to directly experience the particular instance of the class that is being described. For this reason, Peirce argues that the icon, a sign which represent its object, “in so far as it is like that thing and used as a sign of it,”^{vii} offers the only direct way of communicating an idea and that every indirect method must, in some manner, be established through the use of one.^{viii}

As with photography, the creation of a painting begins in looking at an object’s effect – the way light is reflected by it, for instance. But in painting, this effect does not constitute the end product of its representation. Instead, the artist builds from its observation an image, which is not directly affected by the object, but similar to it in that – by his estimation – the shapes, colors and proportions described by the pigment evoke the presence of those features in the object itself. The basis of such an evocation, however, may be afforded through an infinite variety of associations from the direct imitation of the object’s geometric structure to the abstract embodiment of a feeling related to being in the presence of that thing. Each of these, in accordance with the icon’s definition, should initially be of equal merit in serving as a representation because the value of its relation to the object is not inherent to either of these entities, but is proportionate to the extent of its usefulness in comprehending the structure it depicts – a value which can only be ascertained through the experiential validation of the sign’s effectiveness.

In the pursuit of an optically accurate image, this verification may be obtained by using a camera obscura to project the object’s reflected rays onto the surface of the painting, demonstrating whether the lines and shaded areas of the representation are in measured correspondence to the object’s parts as they appear from a particular vantage point. These

measurements can also be achieved through the use of an intermediary device such as a ruler or compass, which provides a mode of indirect comparison by demonstrating that a certain feature of each entity corresponds to a standard unit of length or angle. To make a comparison of this kind, the perceiver must first conceive of the object's appearance as being comprised by a set of geometric parts, whose positions and dimensions may be quantified through the association of each with one of the basic building blocks or primitives of geometry such as a point, line, curve or polygon in two dimensions or a cube, sphere or cylinder in three. By showing that the object's constituent parts conform to the definitional requirements of these figures, the theorems and functions pertaining to those definitions can be carried over to the comprehension of the object itself. Through this, it is possible to not only mimic the object's appearance in a particular state, but also predict how it will behave in circumstances other than those presented in its original observation.

As Peirce argues, "a great distinguishing property of the icon is that by the direct observation of it other truths concerning its object can be discovered than those which suffice to determine its construction."^{ix} For example, the only conditions that must be satisfied in order to produce a right triangle are that the figure must have three sides and one 90° internal angle. But in any figure where these features are present, it will also be the case that the sum of all three internal angles will equal 180° and the sum of the two non-right angles will be 90° . Though the latter stipulations could be included in the definition of a 'right triangle,' the first two are sufficient in describing this figure because it would be impossible to meet these criteria without also satisfying the other two conditions. In this respect, we may say that the latter conditions are simply the logical implications of the figure's definitional requirements and must therefore be universally valid for every figure that we can appropriately call a right triangle.

In addition to the theorems of a figure's internal relationships, other mathematical functions may be logically derived, which describe the relation of the figure as a whole to its spatial environment and can therefore be used to predict unobserved states of an object's appearance. But while these theorems describe the behavior of any existent object that conforms to the definitional requirements of a particular geometric figure, it remains a question of experiential determination to show that the object does indeed conform to these definitions. The

determination that a physical object is in precise agreement with the quantities to which it is associated through the measurement of its parts can never be made as a certain fact. While an angle may appear to the eye to be in precise correspondence to the marking of a compass, its conformance to it can at best be a very near approximation of that value, since between any two points in space another can always be claimed. By that same token, even the markings of a ruler or compass must be seen as mere approximations and not perfect indicators of the units they represent. In most cases, these approximate values will be accurate enough to suit the perceiver's purpose for verifying that an object demonstrates the required traits of a particular geometric category. But in the slight deviation from the claimed values of its measurements, the object's conformance to the definitional stipulations of an abstract geometric figure must similarly be manifest in an imperfect manner. Therefore, it is impossible to conclusively determine that an iconic representation is in precise correspondence to the observed state of the object it seeks to describe. By extension, the slight imprecision of its measurements will either remain present in or be amplified by the transformative functions used in predicting the object's appearance in a spatial context other than that of its original observation.

In mimicking an observed state of the object's appearance, an iconic representation need not account for any of the object's properties beyond the contours of its geometry in that particular instance. But to accurately predict its appearance in an unobserved state, it may also be necessary to represent the object's dynamic properties as well as those of its environment. Though it is possible to represent these factors mathematically as well as to check the model's accuracy against the quantified results of the actual object's behavior, no matter how many times we check this correspondence and find it to be suitably accurate, we can never determine that this will be true in all cases. Any equation or iconic representation describes a limited set of features, and as Peirce argues, "Its necessary character is due simply to the circumstance that the subject of this observation and experiment is a diagram of our own creation, the conditions of whose being we know all about."^x If an existent object possessed only those features described by the equation and was affected by no other, then the representation could perfectly describe this object in any of its possible states. In practice, however, it is impossible to determine that every property of the

object and its environment has been represented by the equation and, as a result, no iconic model can be said to predict the behavior of an object in every conceivable circumstance.

Regardless of its completeness, however, a mathematical formula seeking to describe the potential behavior of an object cannot simultaneously manifest a coherent visual representation of the object's appearance in all possible states of its existence. Using the Schrodinger's Cat experiment as an example, let us imagine a system in which two possible states exist for an object that are mutually exclusive to one another and determined by an external factor – whether a poison has been released as the result of a random event. This system may be simply represented by the conditional statement: if poison is present, the cat is dead; otherwise it is alive. While the box remains closed, this conditional formulation accurately describes the system as a whole but does not provide us with definite knowledge of the cat's state. To make this determination, we must know whether the poison has already been released – an inquiry that has no general applicability and is only meaningful when associated with a specific time. Thus, we encounter the same limitations that exist for photography. Just as a photograph is inextricably tied to a single condition of time and space, so too must be the state of the cat. That is, while a mathematical formula may serve as a sort of double for the object by quantitatively imitating the properties that determine its appearance, this descriptive model alone cannot constitute a representation of any of the object's possible states of appearance. Rather, the formula must be supplied with particular input values, which locate the object within a specific set of circumstances, in order for it to manifest a particular expression of the system of potentials it describes.

Due to the finite nature of the speed of light, however, determining whether poison has been released into the cat's chamber not only requires that the observer specify a time of inquiry but also that his or her physical relation to this event must be taken into consideration. Let us imagine a variation of the cat experiment which uses a transparent box and two observers, one of whom is stationed inches from the box while the other is moving away from it at a considerable velocity. Since the light signal conveying the cat's death will take longer to catch up with the moving observer than it will to reach the stationary one, it follows that if each observer could be given a clock that was perfectly synchronized to the other's, the stationary observer would

witness the cat's death while the moving one still experienced it as alive. In order to reconcile this seeming disparity under which it would appear that the cat simultaneously occupies two mutually exclusive states, in accordance with Albert Einstein's theory of Special Relativity, we must tailor our model such that each of these observers is assigned to its own relative *observational frame of reference*. That is, to unambiguously establish the unique location of an event in time and space, we must associate it with the particular coordinate system in which its observer resides. If two observers are not moving with the same velocity relative to the object, they cannot be said to occupy the same coordinate system. One product of this relativistic phenomenon is that the observer in motion relative to the object may experience the effect of Lorentz contraction whereby the object's shape will be elongated along the axis of the observer's motion in comparison to the shape experienced by the stationary observer. This effect – a consequence of the fundamental role that the speed of light plays in the structure of space and time – is not an optical illusion, but a true reflection of the object's state as measured by an observer in relative motion. These measurements are no more or less indicative of the object's true state than those taken by an observer whose measuring device is in direct contact with it. The object has no "true" state, but an infinite manifold of possible states, each of which can only exist in relation to a particular frame of reference. We can no more determine the object's true dimensions in relation to an unspecified observer than we can ask whether the cat is alive at an unspecified moment in time. Though the conditions under which Lorentz contraction would occur to a noticeable extent are unlikely to be met by any scenario of human observation, the implications of this and other relativistic phenomena – that an object does not reside in an absolute state and each observed state must therefore be relative to the circumstances of its observation – should play an integral role in our consideration of the implausible notion of a complete representation.

Since we cannot - by any method – simultaneously present every facet of an object's structure to an individual observer, the process of creating a representation must instead be comprised of the artist's selection of the observational circumstance that he or she believes best conveys a particular meaning in the object. In photography, this is achieved through the choice of camera position, lighting, the moment of exposure and so forth. For an iconic medium, in

addition to the selection of an observational circumstance, the artist constructs a model of the object and its environment, deciding which of their features are relevant to the representation's purpose. Due to the fact that an object's state can only be manifest in relation to a particular observational circumstance, we may reasonably suggest that the meaning conferred upon an object by a representation is only relevant to the individual state it depicts. That is, a description of an object from one point of view may not hold true from another. In practice, however, two observational circumstances may be largely indistinguishable from one another. In such cases, the representations produced under these circumstances will effectively enable the same comprehension of the object just as two wavelengths whose values differ only slightly from one another may both be called 'green.' Since most circumstances of human observation have many properties in common – the constant strength of gravity on earth, the spectrum of wavelengths visible to us and the perspectival mode of our vision, for instance – the states evoked by these circumstances will possess a certain categorical resemblance to one another. Other potential states, however, remain wholly inaccessible to our natural mode of experience.

Computer environments allow us to create accurate iconic representations of complex systems and can therefore be used to model an object and a circumstance of its observation which would be otherwise inaccessible. Since each circumstance will manifest different properties in the object, the modeling of physically unachievable circumstances allows us to discover properties in the object that do not otherwise exist, but which may be useful to the conveyance of a particular aesthetic meaning. At the same time, however, the utility of a particular observational circumstance only exists in its ability to bring out certain properties in an object. If these properties can only exist in relation to a particular circumstance, then our reason for wanting to discover them seems to paradoxically require prior knowledge of their aesthetic usefulness with respect to that circumstance. Since there is an infinite variety of possible observational circumstances, those accessed by our natural experience comprise an infinitesimal fraction of all those possible. How then can we discover new properties in an object? One approach might be to have a computer apply random circumstances to a model of the object. Given infinite time, this method would render a representation of each of the object's possible states. Yet, the value of manifesting any particular state would not necessarily be evident to the viewer unless that state

had some categorical resemblance to one already known. So, while computer modeling systems allow us to access the infinite manifold of an object's possible states, they cannot verify whether the representation of any of these states will aid a particular comprehension of the object that we ourselves cannot predefine. Rather, the context for a particular structure of meaning must develop organically out of the gradual movement past the boundary of a preexistent category. Since no comprehensive meaning may be ascribed to the object, the best understanding of it must come through the comparison of multiple states and the inference of their relation. Naturally, the observation of a broader spectrum of states will produce a wider understanding of the object. Yet, to understand the relation between states, their difference must not be too great and the factors which have contributed to this difference should be known to the observer. In this respect, the great benefit of computer models is apparent – by descriptively quantifying each aspect of the object individually, we may run the same simulation over and over, each time changing only a single variable and thereby coming to a better understanding of the variable's effect on the model in general. The infinite variety of meanings comes from the infinite variety of an object's properties and the circumstances of observation which afford them. If a complete representation were possible, its meaning would be finite and resolute. In absence of total cinema, we are given something much greater: endless possibility.

ⁱ André Bazin, "The Myth of Total Cinema," trans. Hugh Gray, What is Cinema? (Berkeley: University of California P, 1967) 20.

ⁱⁱ *Ibid.*, 21.

ⁱⁱⁱ André Bazin, "The Ontology of the Photographic Image," trans. Hugh Gray, What is Cinema? (Berkeley: University of California P, 1967) 12.

^{iv} Bazin, "Myth" 19.

^v Charles S. Peirce, "Logic as Semiotic: The Theory of Signs," Philosophical Writings of Peirce, ed. Justus Buchler (New York: Dover, 1940) 107.

^{vi} Bazin, "Ontology" 14.

^{vii} Peirce, "Logic" 102.

^{viii} *Ibid.*, 105.

^{ix} *Ibid.*

^x Charles S. Peirce, "The Nature of Mathematics," Philosophical Writings of Peirce, ed. Justus Buchler (New York: Dover, 1940) 138.