The Art of Graphics Programming

Week 1: *Evolution of the Medium*

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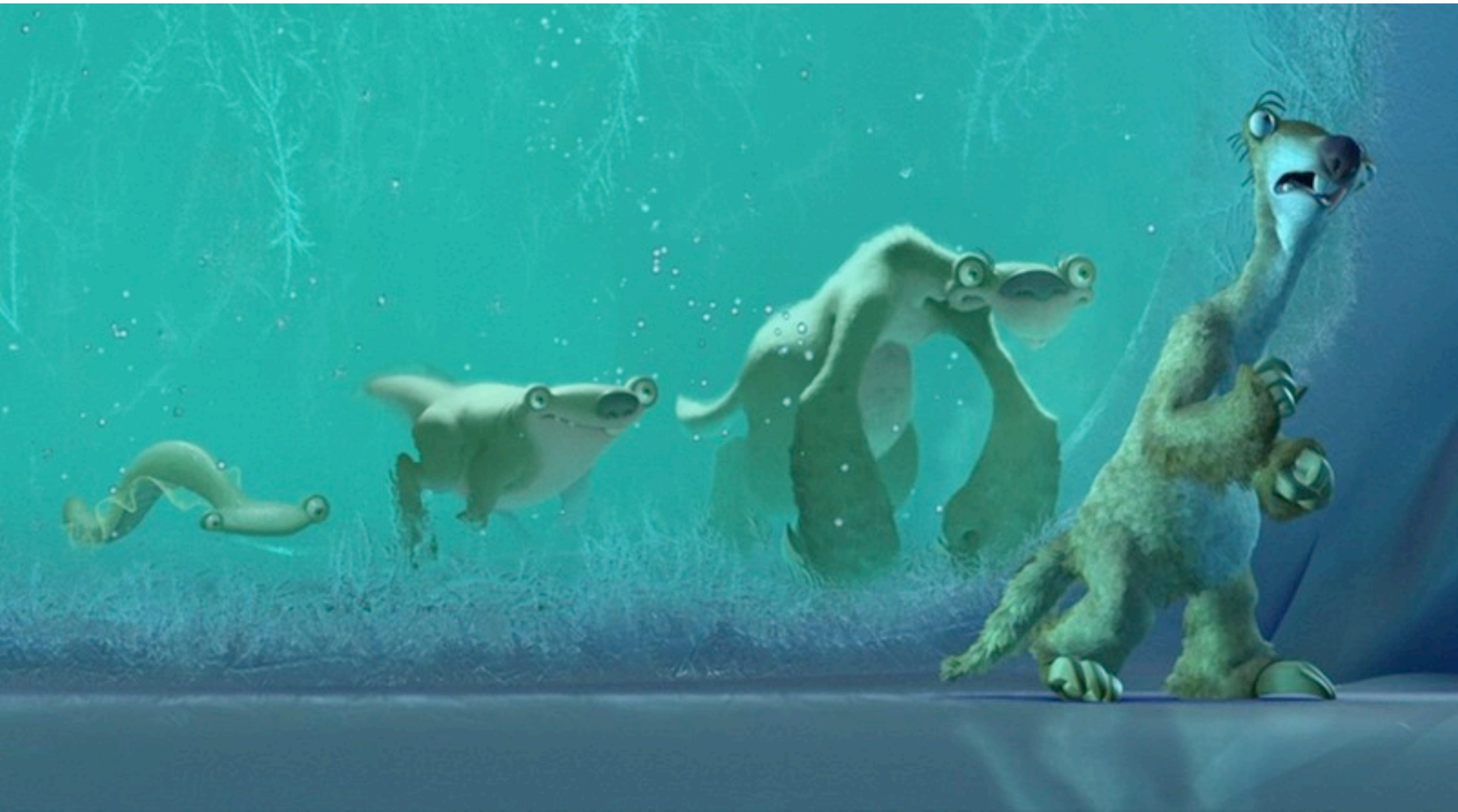
NYU ITP - Fall 2012

"Any account of the cinema that was drawn merely from the technical innovations that made it possible would be a poor one indeed. On the contrary, an approximate and complicated visualization of an idea invariably precedes the industrial discovery which alone can open the way to its practical use."

André Bazin, *The Myth of Total Cinema*



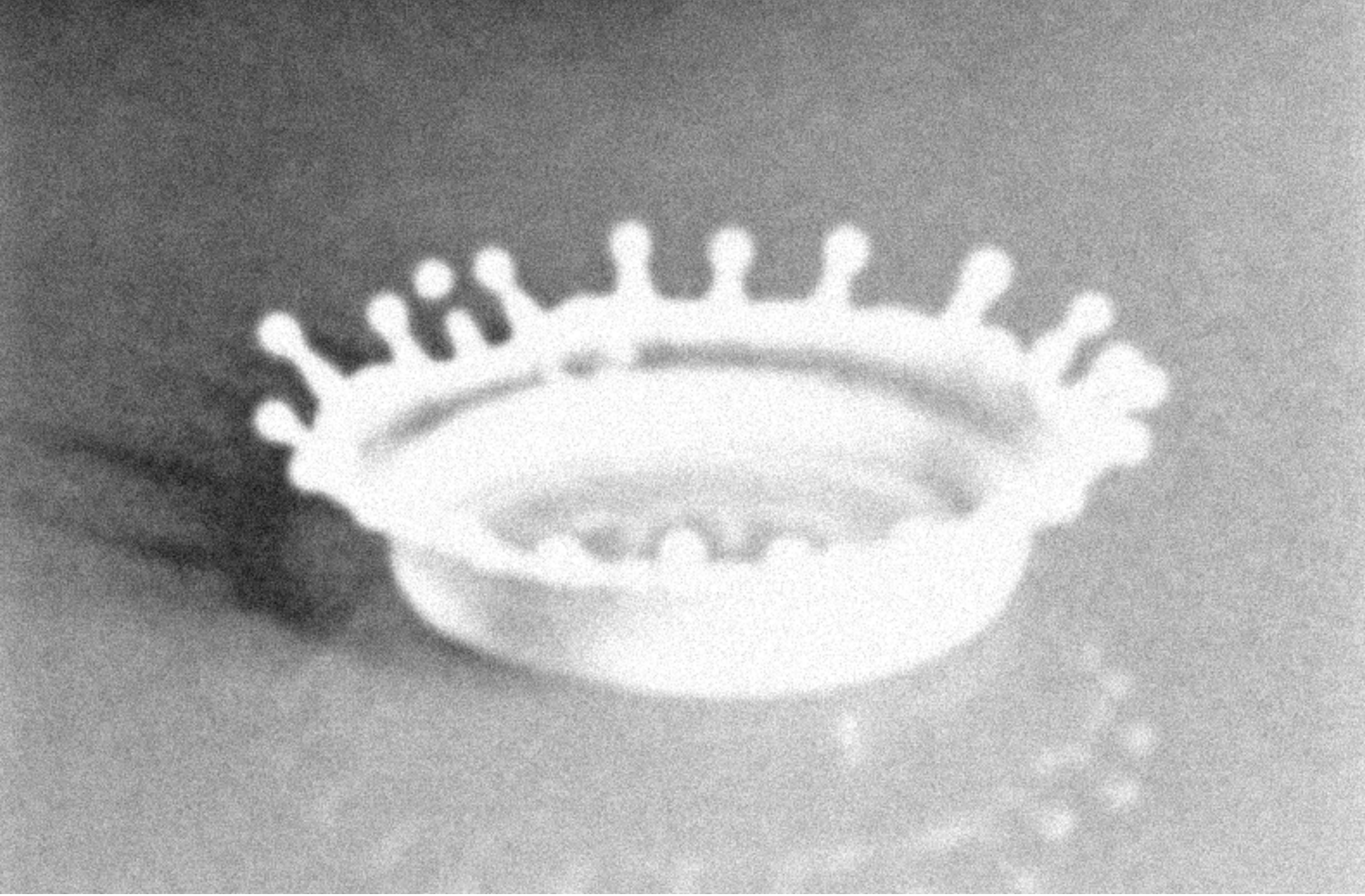
Aesthetic Decisions, Complete Representation and "The Myth of Total Cinema"

"If the cinema in its cradle lacked all the attributes of the cinema to come, it was with reluctance and because its fairy guardians were unable to provide them however much they would have liked to.

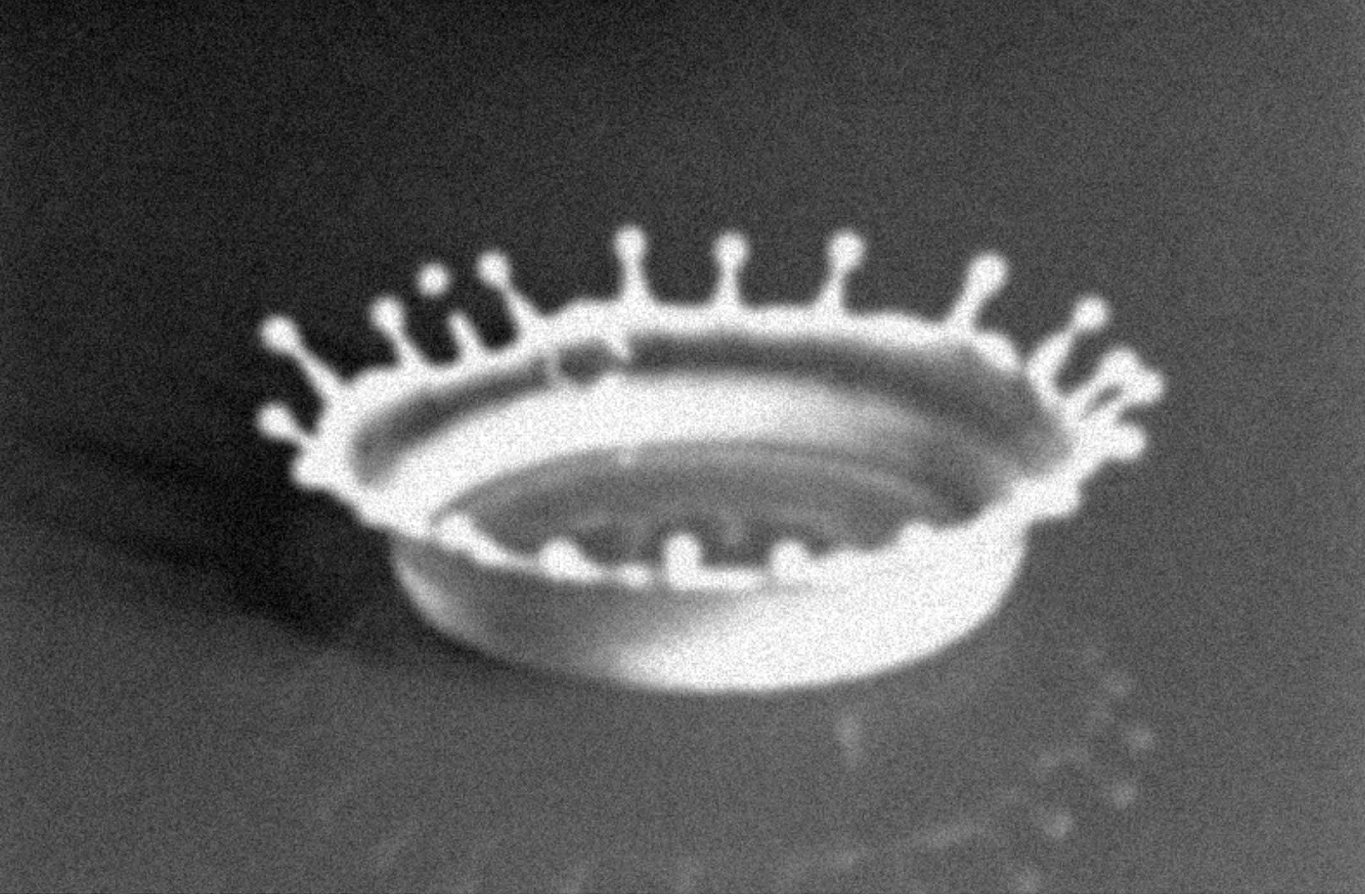
The real primitives of the cinema, existing only in the imaginations of a few men of the nineteenth century, are in complete imitation of nature. Every new development added to the cinema must, paradoxically, take it nearer and nearer to its origins. In short, cinema has not yet been invented!

The cinema was born from the converging of these various obsessions, that is to say, out of a myth, the myth of total cinema."

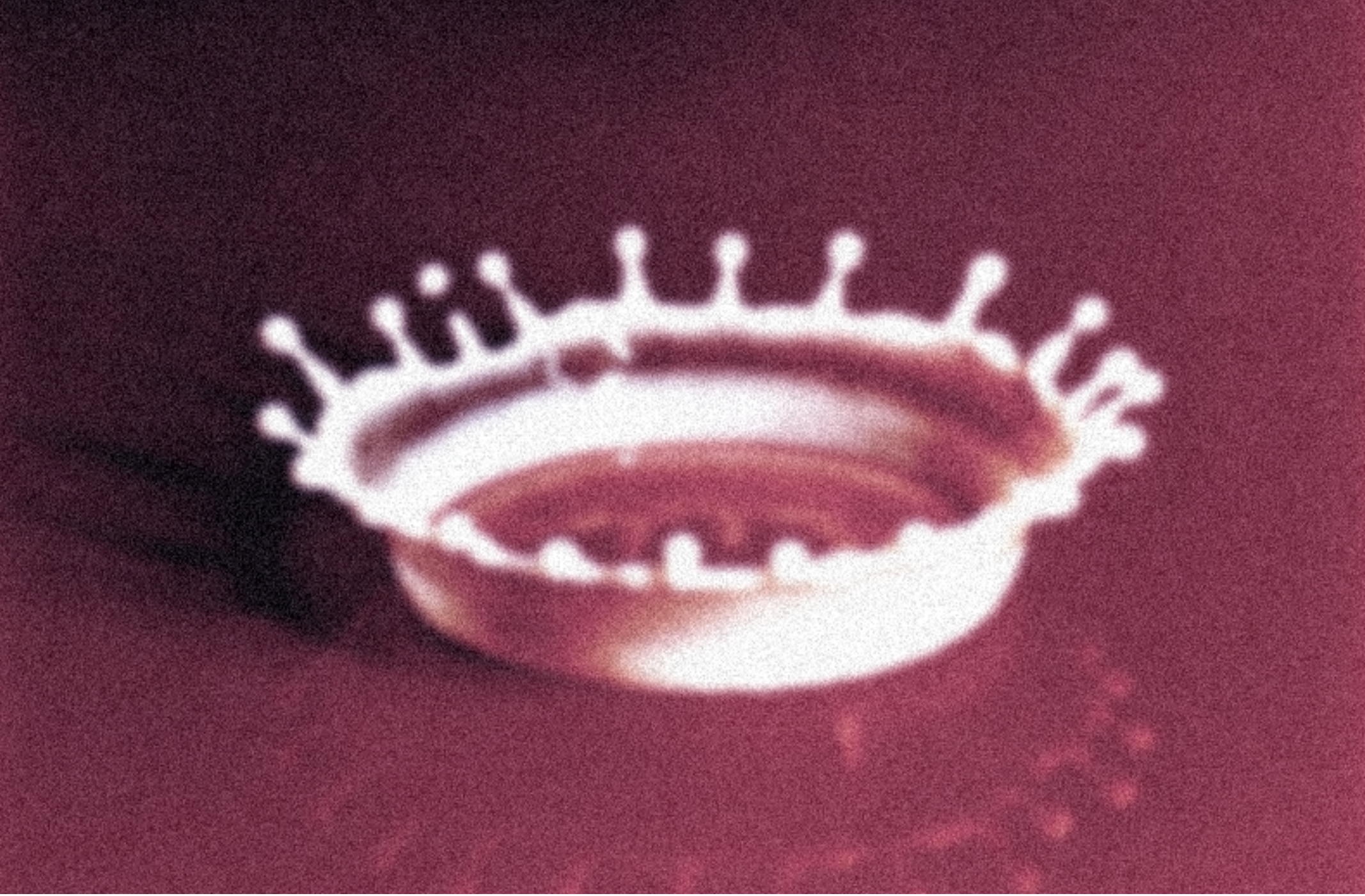
André Bazin, *The Myth of Total Cinema*



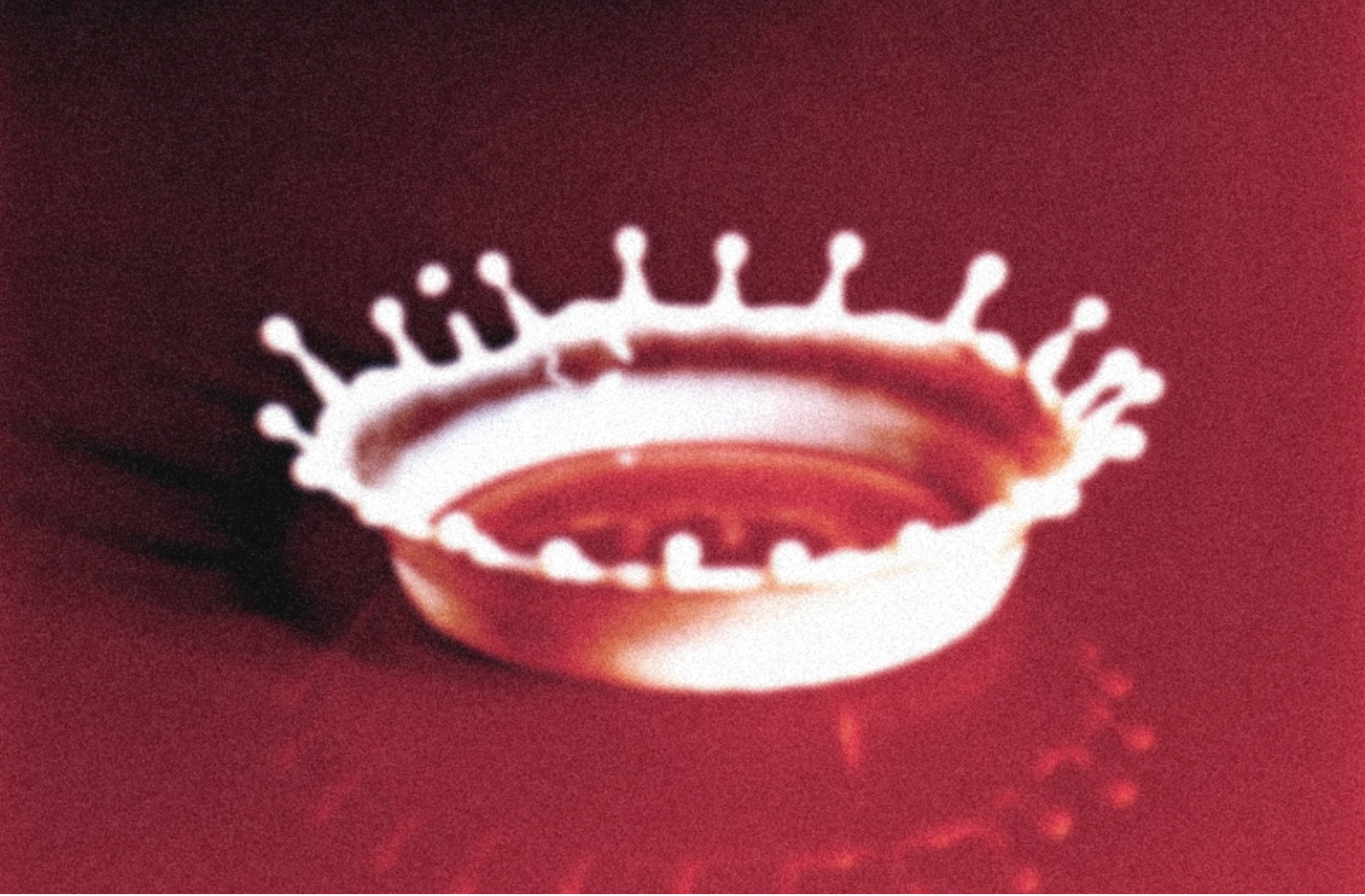
The first cameras were not very good.
But they did the same basic thing that all cameras do.



They record an optical impression of the physical world,
no matter how hazy or incomplete that impression might be.



With each technical advancement, the impression refers to a greater number of the object's visual properties.

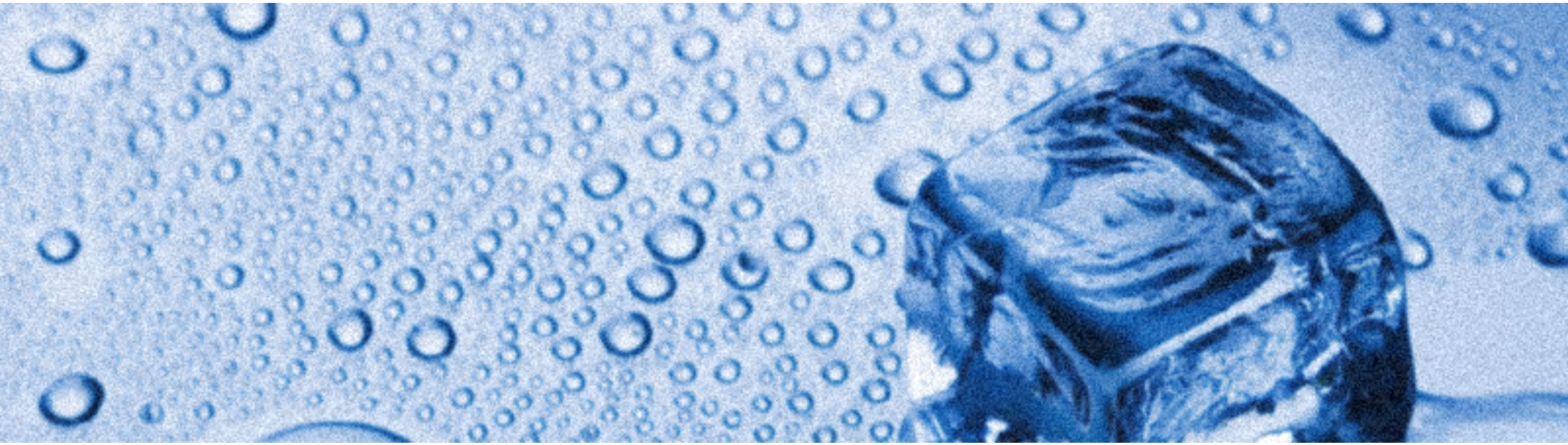


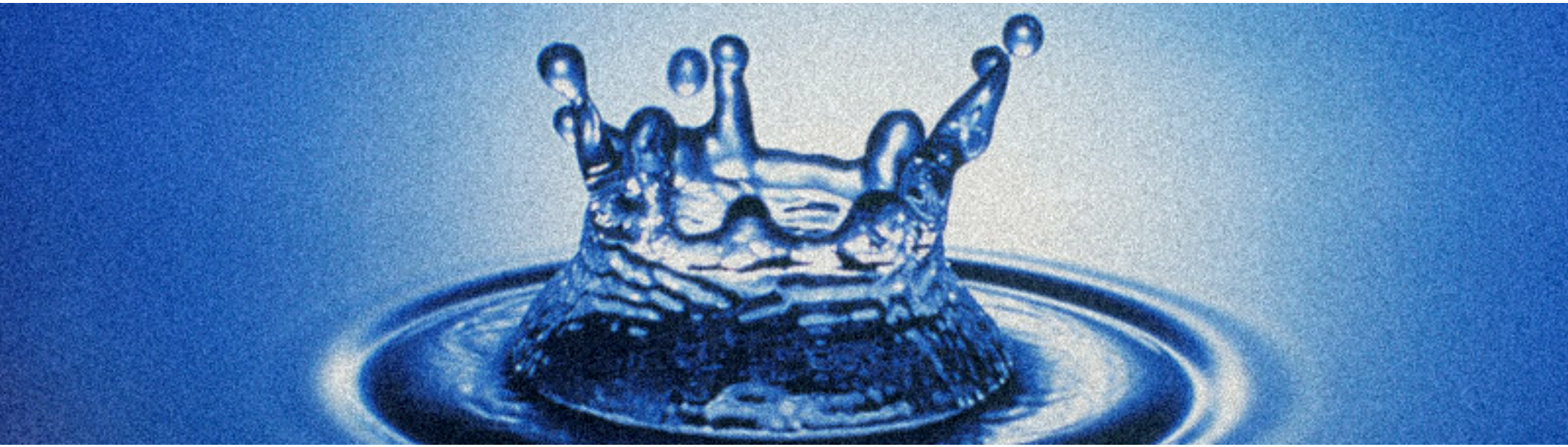
But there are always an infinite number
of properties left to record.

The photograph can never be complete.

It remains as circumstantial evidence -
tied to a single, fragmentary instance of the object's appearance.

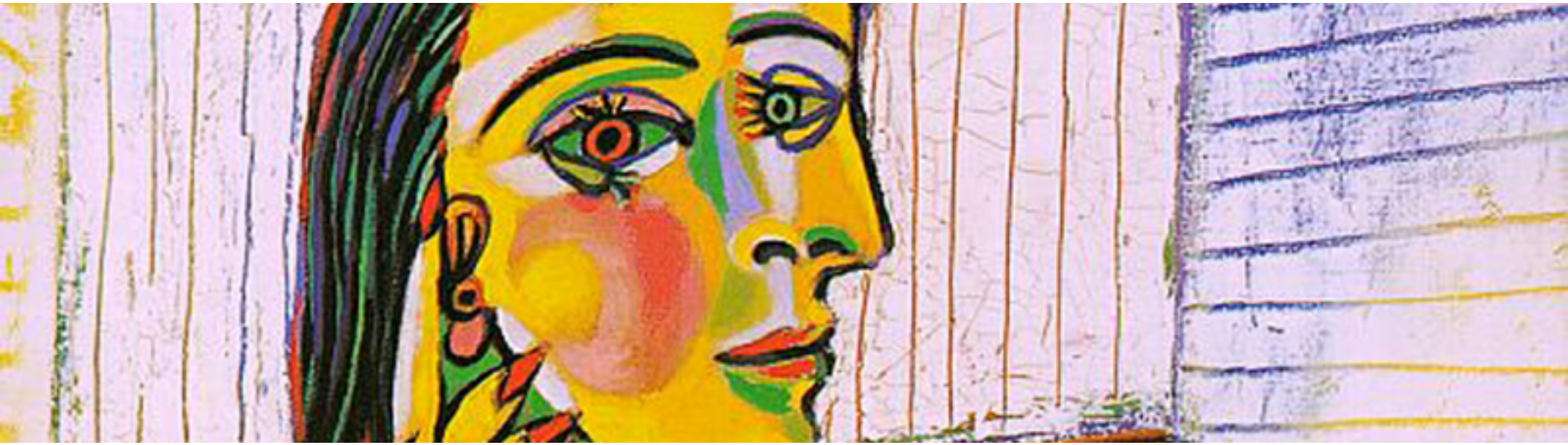
To represent ice…





…is to not represent water.

To represent a Cubist perspective…

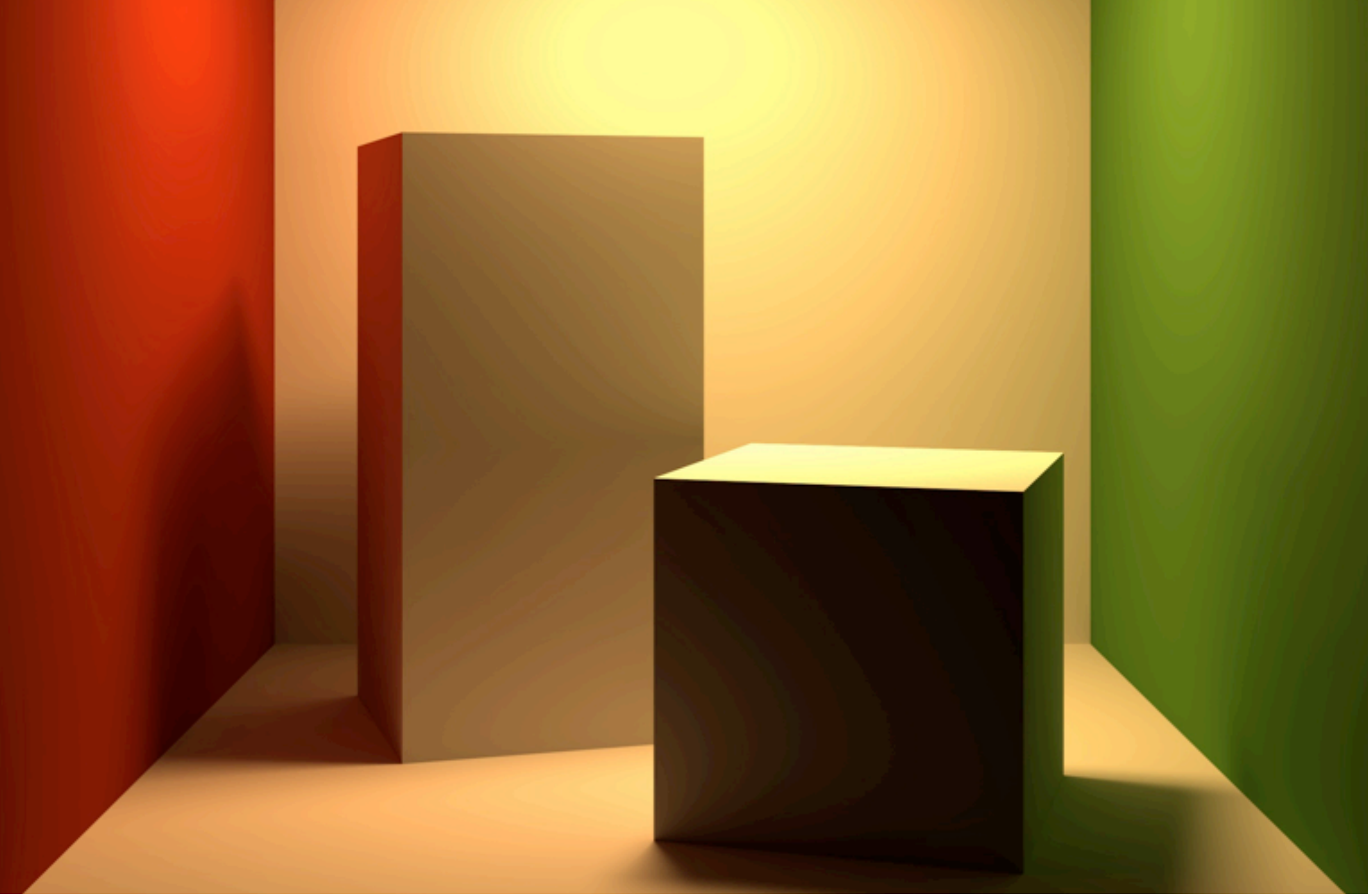


…is to not represent a classical one.

This makes art possible.

Since we cannot represent everything about an object, we must choose a subset of properties that offer a particular understanding of it.

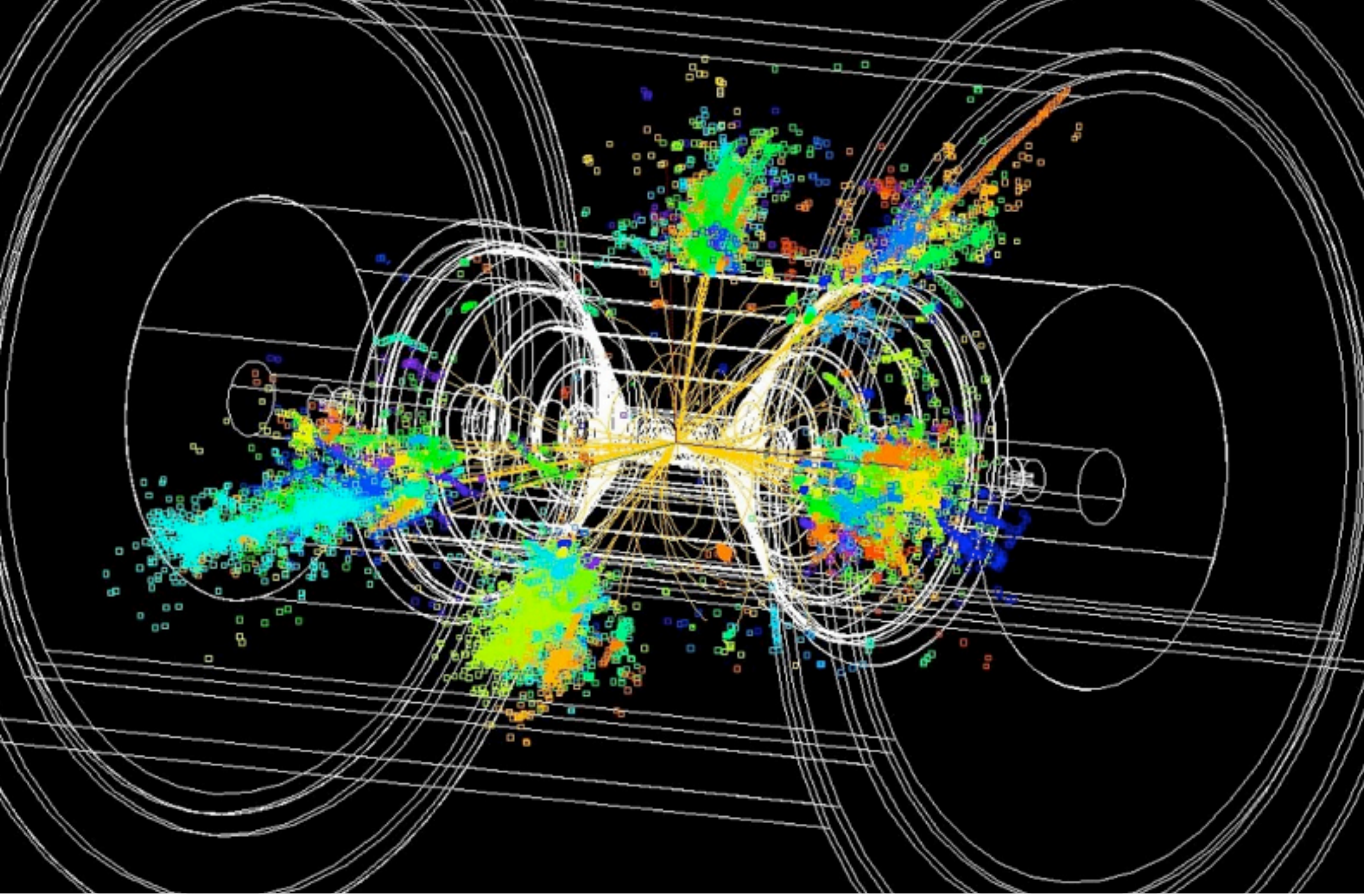
In photography, we select a camera angle, lighting scenario and the "the decisive moment."



In computer graphics, we start with a blank slate and any desired trait, even the presence of light and physics, must be explicitly added.

In addition to capturing the appearances of objects,
computers allow us to represent the behaviors of complex systems.

As a result, they have brought the myth to a new plateau,
the myth of Total Simulation.



Computers can simulate everything with some degree of accuracy and depth, but cannot simulate anything completely.

Some things are irrational, infinitesimal, indeterminate or hidden and simply cannot be simulated in full.

It seems we have returned to the origin of the myth.

Design Tools, Ahistorical Progress and *Piano Tops*

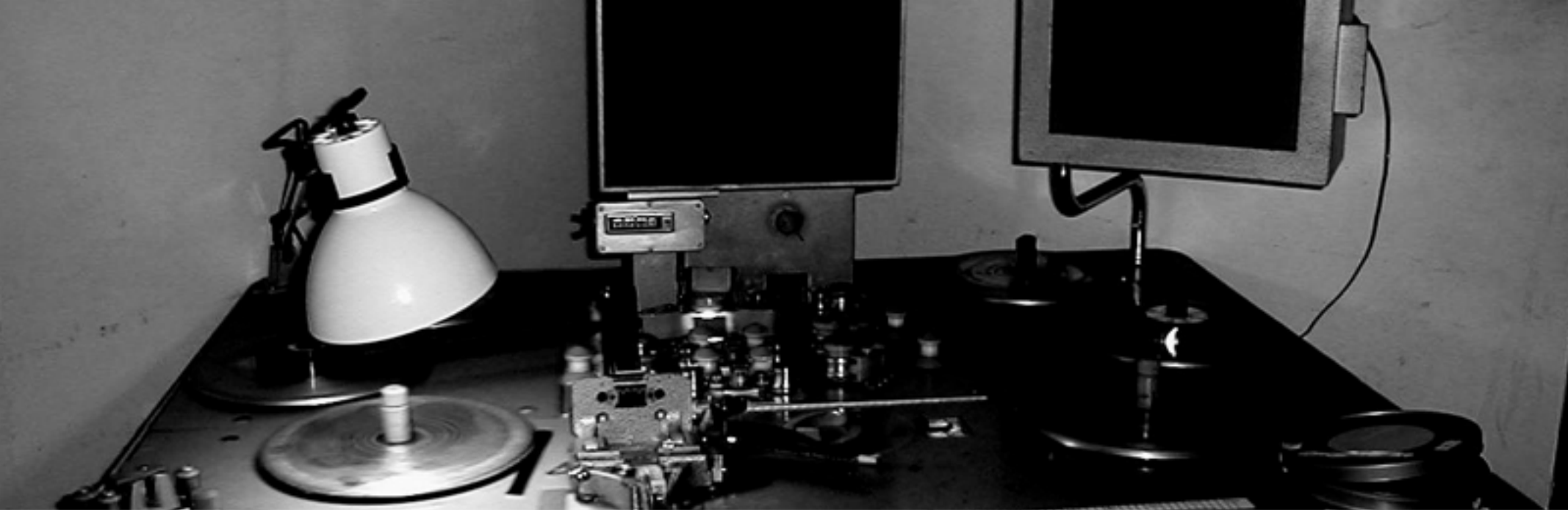
“If you are in a shipwreck and all the boats are gone, a piano top buoyant enough to keep you afloat that comes along makes a fortuitous life preserver. But this is not to say that the best way to design a life preserver is in the form of a piano top.

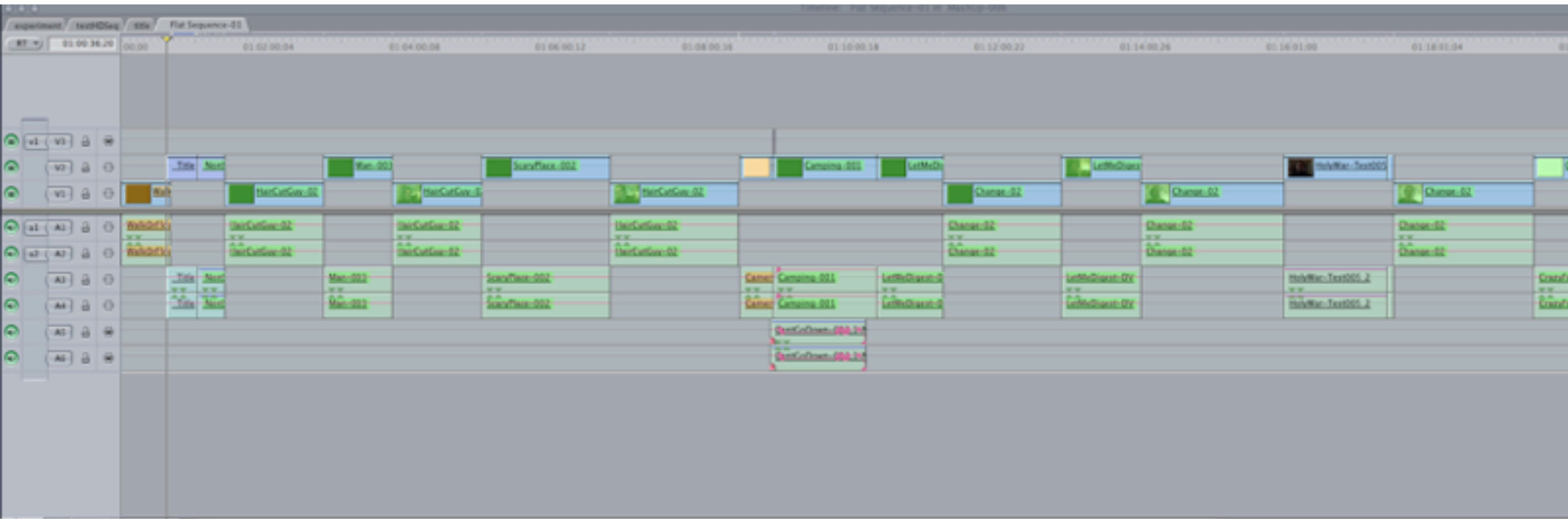
I think that we are clinging to a great many piano tops in accepting yesterday’s fortuitous contrivings as constituting the only means for solving a given problem.”

R. Buckminster Fuller, *Operating Manual for Spaceship Earth*

Piano tops can be found everywhere in computing.

Software developers attempt to maintain backwards compatibility with decades-old systems.



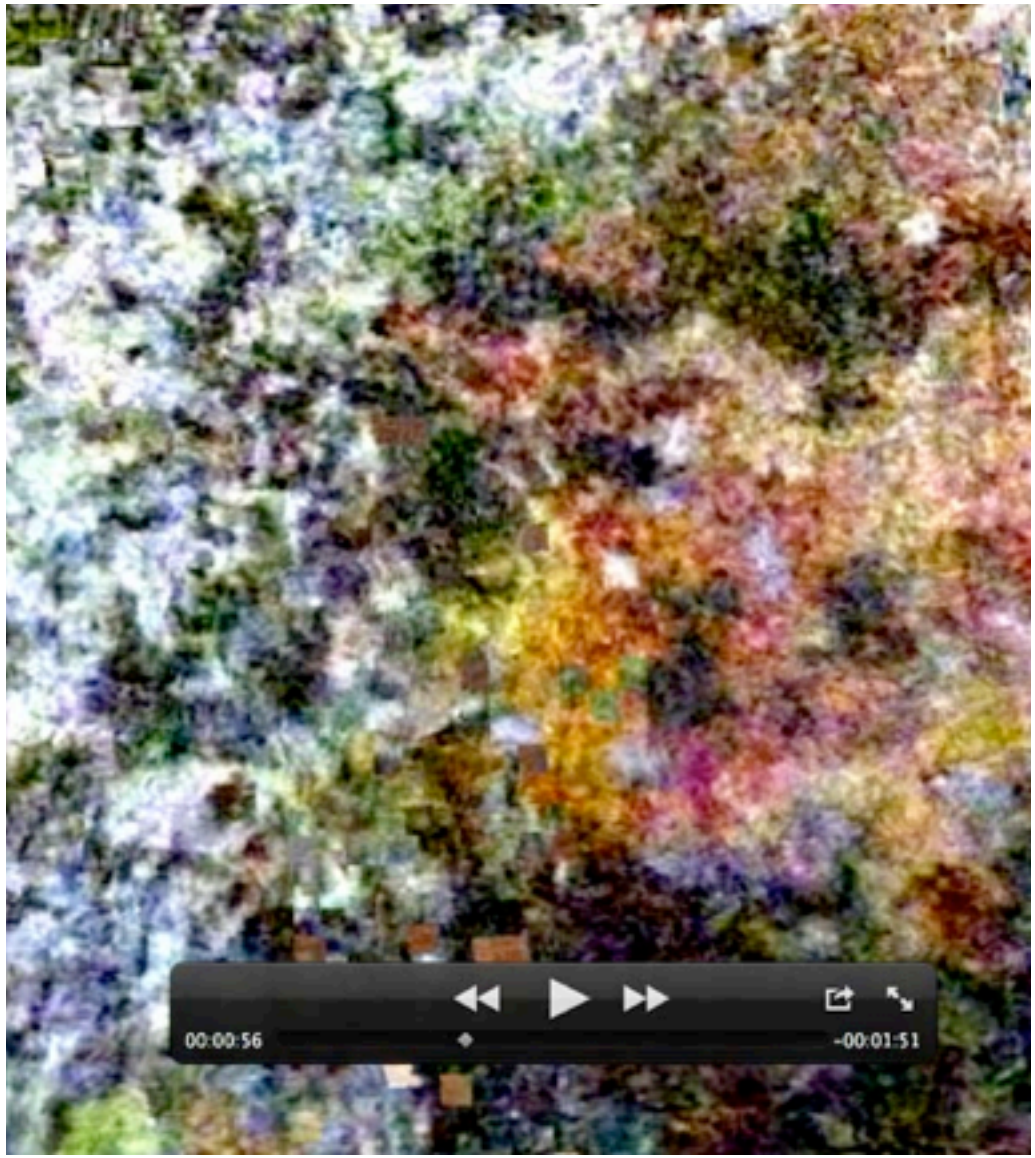


Digital interfaces borrow the iconographies
of their analog predecessors.

Tools with novel capabilities, unique to digital media,
are applied to the creative vocabularies of preceding mediums.

“In short, cinema has not yet been invented!”

"What had to be exhibited was not only that which was unique and irreducible in art in general, but also that which was unique and irreducible in each particular art.



Each art had to determine, through its own operations and works, the effects exclusive to itself."

Clement Greenberg, *Modernist Painting*

Computers have largely flattened the terrain of what is creatively accessible, we can model anything imaginable.

We can simulate every existent tool as well as
create an infinite assortment of new tools.

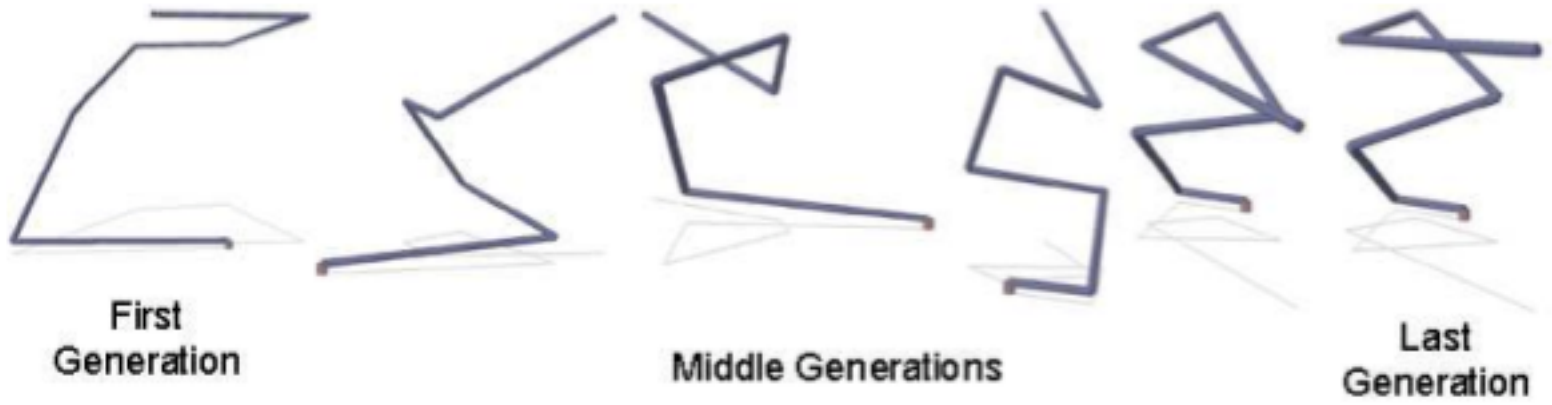
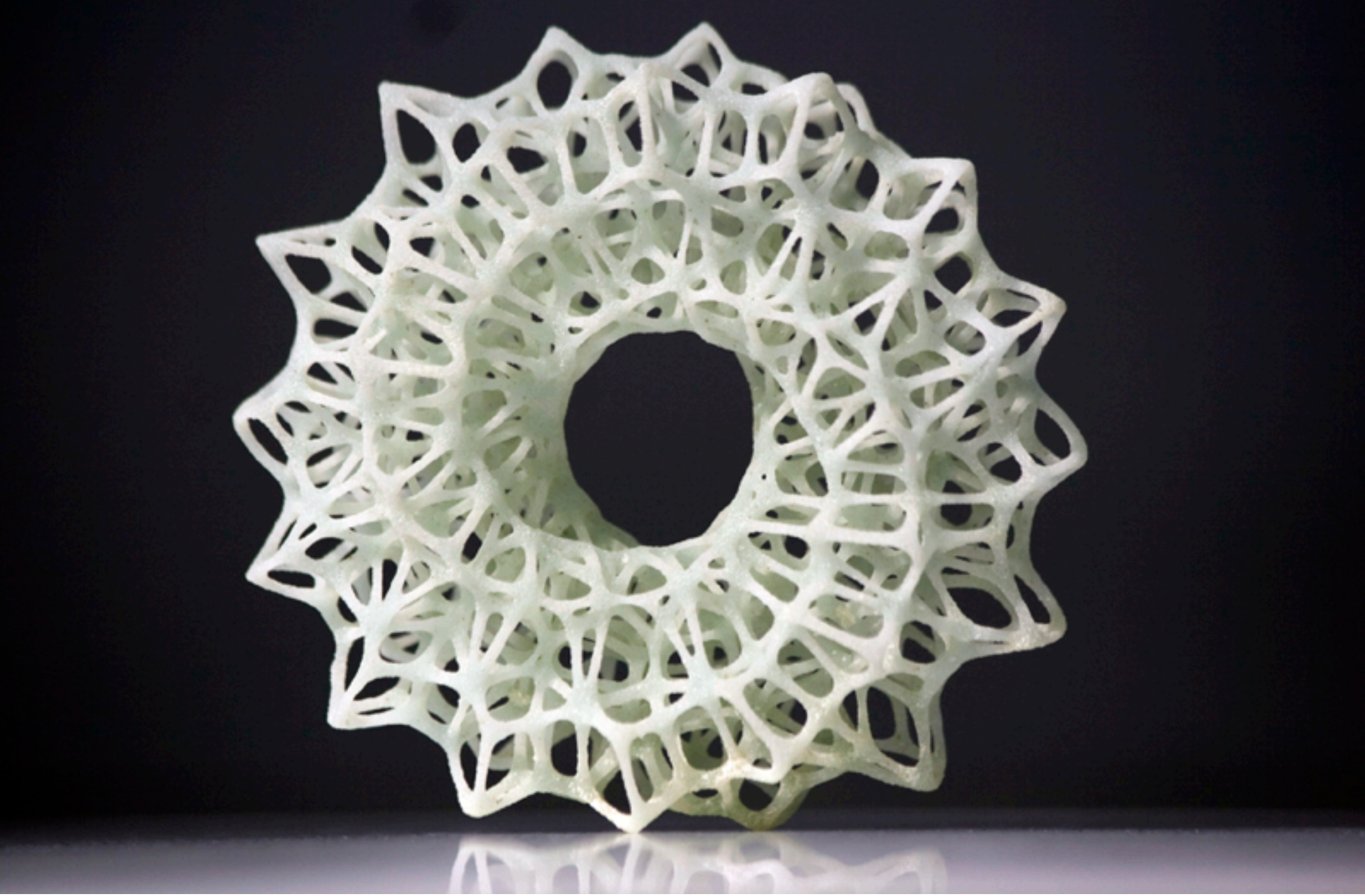


Fig. 10. Sequence of evolved antennas leading up to antenna ST5-33.142.7.

We can even build evolutionary simulations that act as autonomous design tools.



And we can bring all of this
back into the real world.

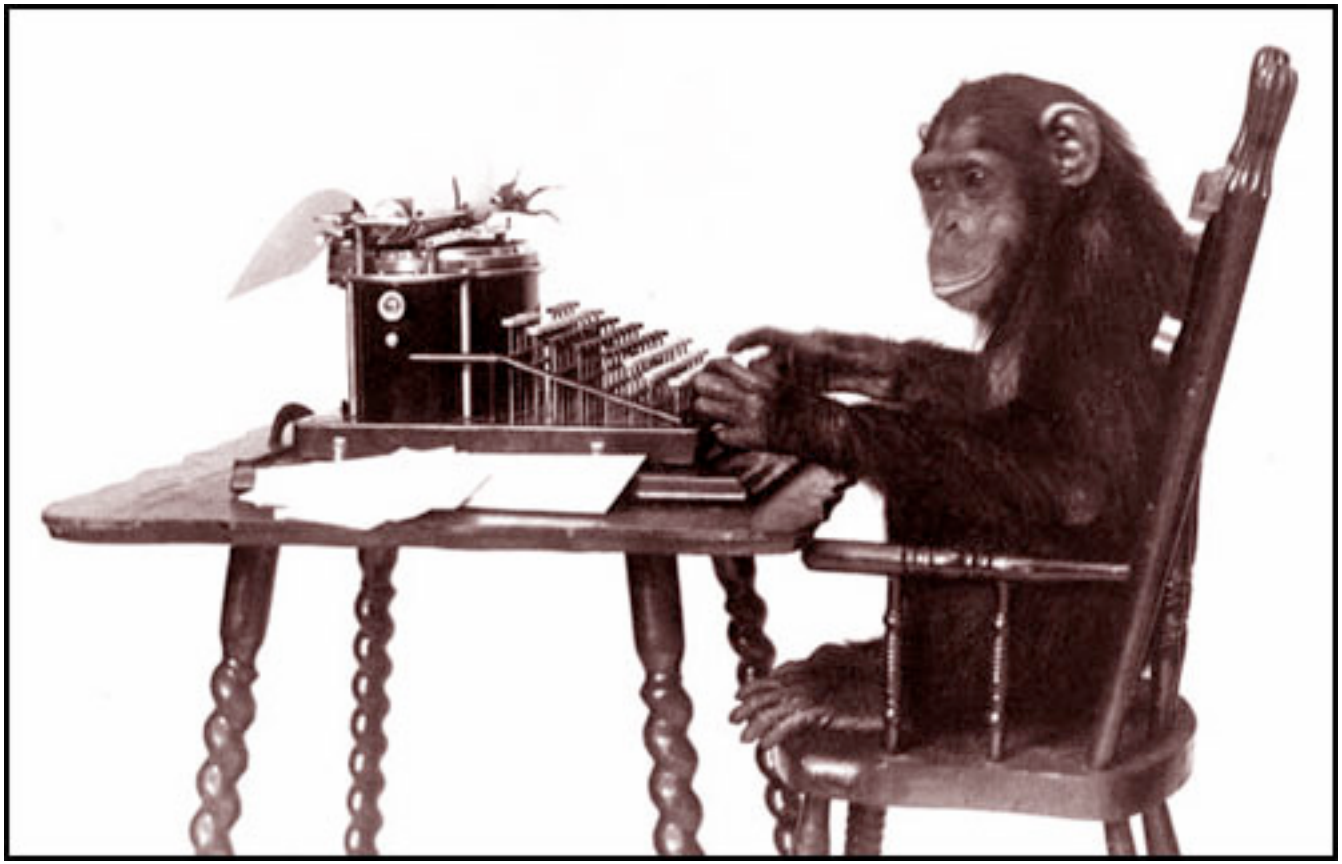
In a sense, this seems to suggest the possibility of an *ahistorical* design period.

That is, if computers can arrive at optimized design solutions developed outside of any historical lineage using a form of structured probability…

...then the only challenge left
would be to conceive of what is worth building.

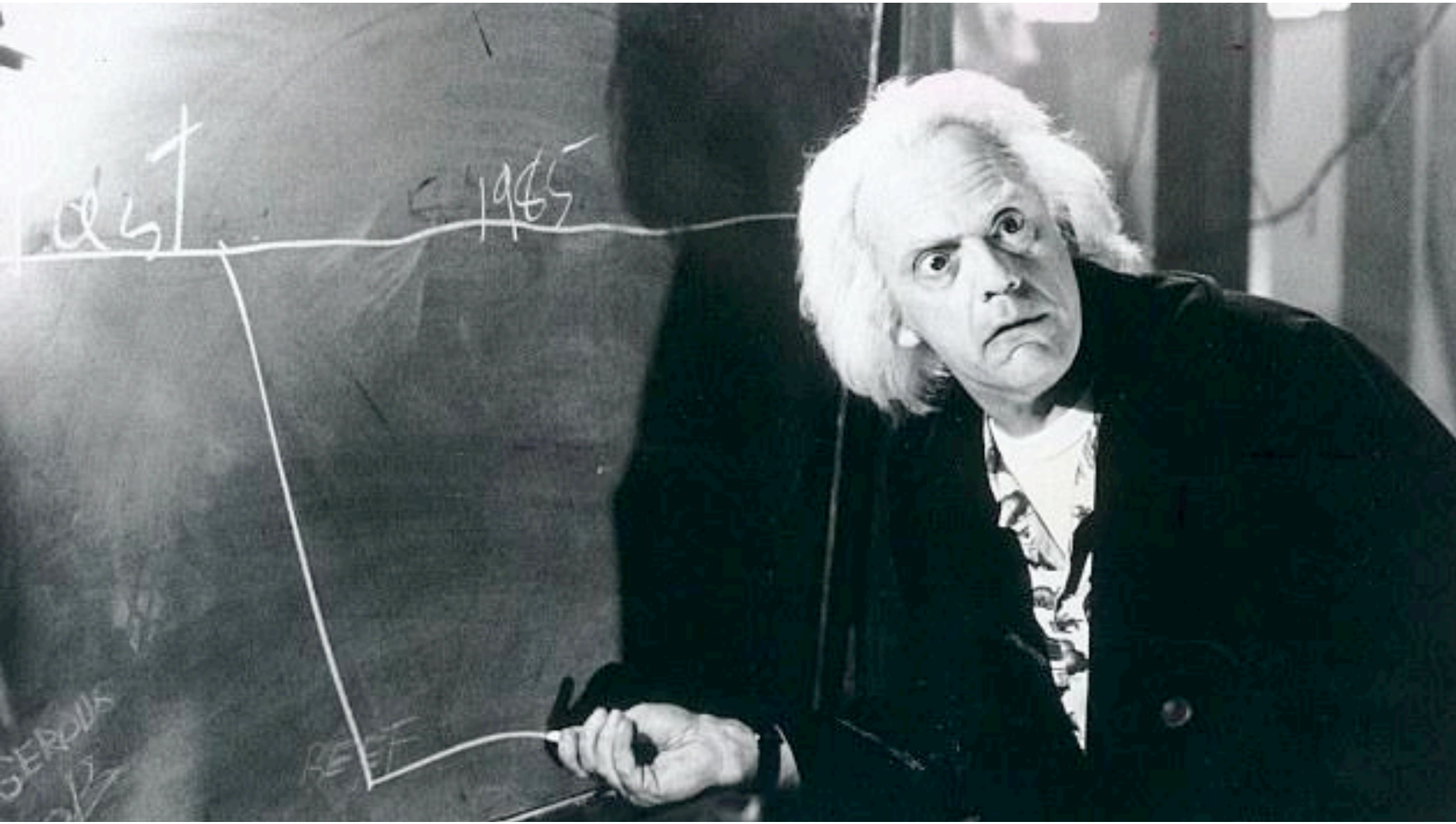
We would be free from all piano tops,
only the essential elements in “solving a given problem” would remain.

But since an infinite number of things are possible, in practice computers can only solve certain types of problems automatically.



Others require a human sensibility to - at the very least - identify when something significant, such as *Hamlet*, has been created.

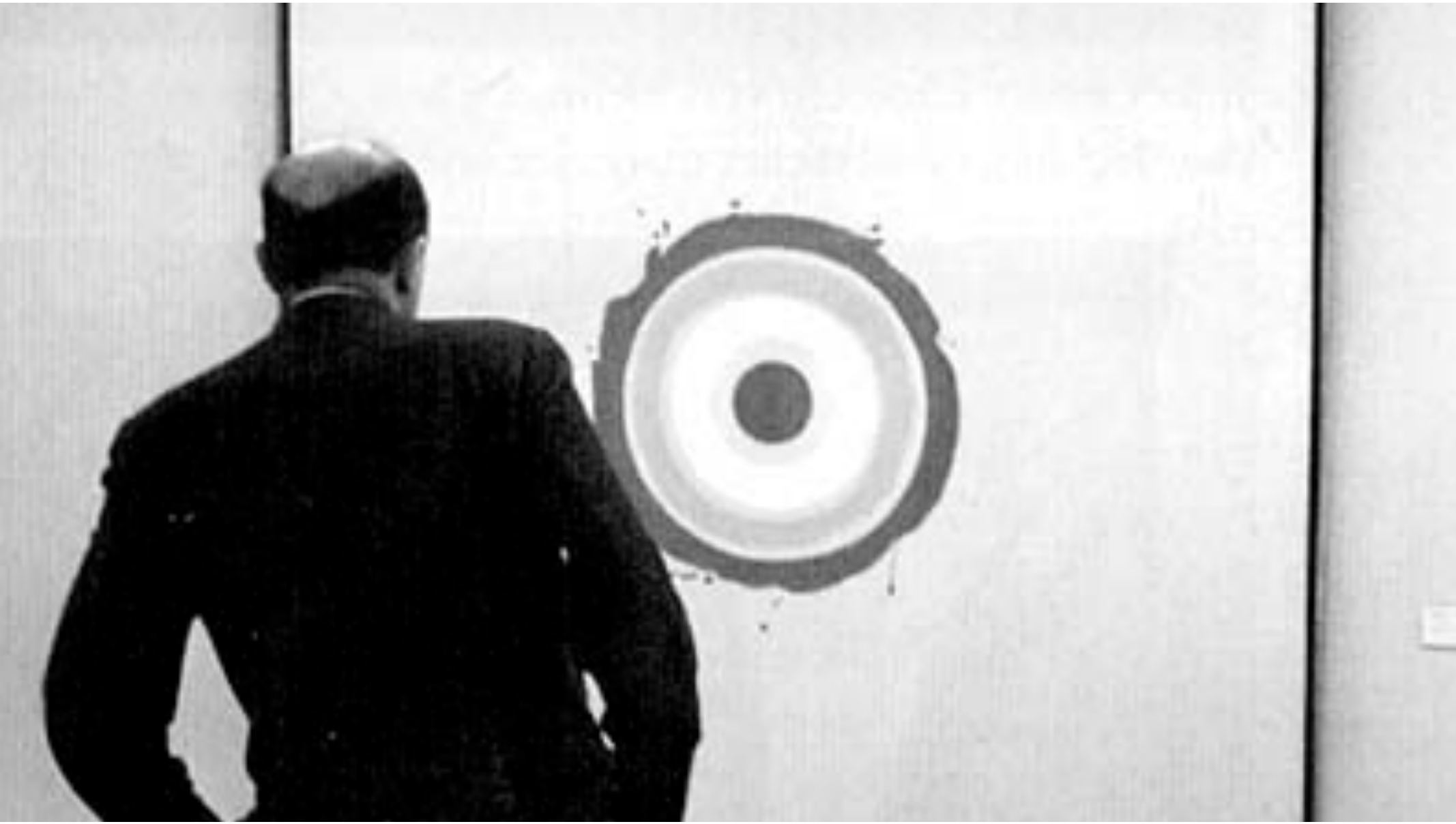
We cannot simply jump ahead in design history
because the value of a tool or creative work is not absolute.



Instead, its value exists in the extent to which it embodies
an existent need or sentiment of the context in which it finds itself.

Therefore, we cannot necessarily preconceive the value of a particular invention without scaffolding our way to needing it.

Clement Greenberg argues that in order to advance a medium, we need to discover and embrace its unique properties.



It is difficult to do that here because computers seem to encompass all possible properties, but only in a somewhat intangible way.

Much of learning to make art and design physical systems is about observing and experimenting with materiality and the senses.

Though software does not have physical properties like sand, we cannot grasp its full potential without exploring its structure and limits.

Early experience with materials comes in a variety of forms
from the utterly pre-packaged to the completely open-ended.

Software can be the ultimate open-ended material,
but also comes in many pre-packaged forms.

To do something original with the material,

Untitled 3

Compile ⌘⌥C Auto Compile

```
void main()
{
    gl_FrontColor = gl_Color;
    gl_TexCoord[0] = gl_MultiTexCoord0;
    gl_Position = ftransform();
}
```

Compile Log

Compile Succesful.

we need to learn what it's made of.