

# Finding Harmony and *Dissonance* Between Science and Film

At STAGE Lab, we are developing a curriculum aimed at University of Chicago undergraduates that explores the fascinating intersections of science and film. In our efforts to develop a course, we have identified the essential concepts, such as plot, subject, and form, that come into play when the two worlds collide.

## Intersections of Science and Film

Science has been a core part of filmmaking since the advent of film. Films can incorporate scientific ideas in their plots, characters, objects, narratives, and techniques. However, this can be challenging, as films often take creative license and compromise scientific accuracy. This can lead to misconceptions in the public and promote stereotypes about scientists. As such, the relationship between film and science is complex. While the incorporation of science into film can be generative, it is important to be aware of the potential for inaccuracies and stereotypes.

Film Aspect	Science Aspect	Examples	Harmony	Dissonance
<b>Characters</b>	The film involves subjects that are scientists	<i>Don't Look Up, The Imitation Game</i>	Peculiarities of a scientist make a compelling subject with self-evident depth	Accurate day-to-day science is often boring or too intricate
<b>Plot</b>	The plot utilizes an aspect of science or a scientific concept	<i>Her, Cells at Work!</i>	A scientific premise can elaborate fantastical aspects of science	If the concept is too complex, it risks losing the audience
<b>Audio-Visuals</b>	The recording with innovative instruments, digital processing techniques	<i>Interstellar, Toy Story</i>	Scientific advances expand the space for artistic expression and faithfully reproduce it.	Use of unconventional techniques can be polarizing
<b>Technique</b>	The film uses of a novel technology to create film	<i>Avatar, Sunspring</i>	Creation of previously unrealizable films to a creative effect	Gimmick-use, Automation distances human
<b>Objects</b>	Film uses scientific and technological objects are prominently	<i>Star Wars, Mothlight</i>	Hard science fiction benefits from common knowledge of science	Commodifying scientific objects and misuse



*A Trip to the Moon* (1902)    *Creature From The Black Lagoon* (1954)    *Cells at Work!* (2018)    *Her* (2013)    *The Imitation Game* (2014)

Examples of existing science media

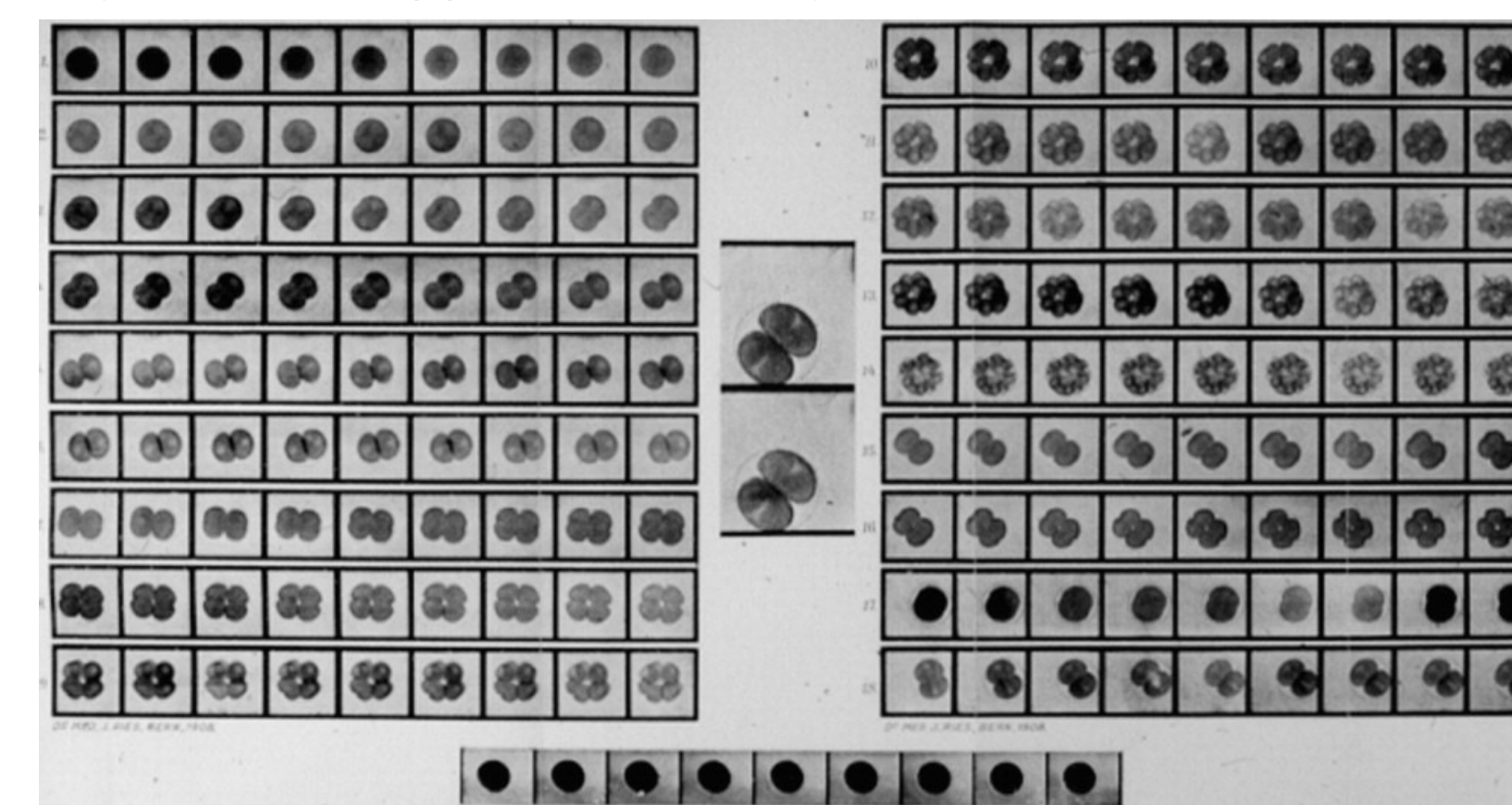
## Film for Science, or Science for Film?

### Science-First Films

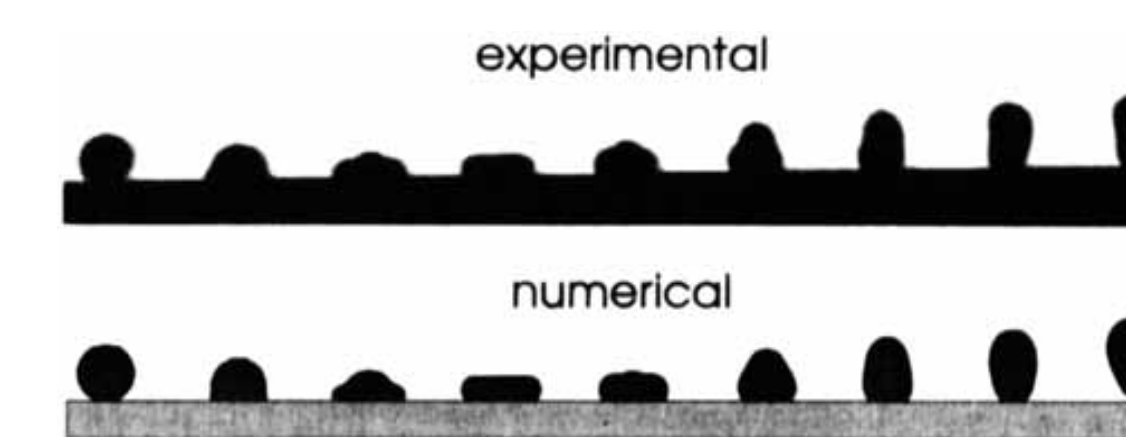
Science-first films are generally aimed at aiding scientists, science enthusiasts, and the general public to learn new information, whether for research or education. They can be broken up into the following categories:

#### 1. Scientific Visualization

While writing, graphs, and diagrams can convey certain ideas, films provide an additional dimension of time that is essential to several scientific ideas. Indeed, recording and visualization of scientific objects has enabled a detailed observation of phenomena that might be too subtle for a human eye and mind to catch with a single observation. The play with temporality, whether it is in slow motion or in time lapses, has led to observation of rapid and sluggish motions present in nature.



Stills from time lapse, "Cinematography of Fertilization and Development," published by Julius Ries (1909)



Comparison a slow motion video of a droplet colliding with a hot wall with numerical predictions, from Karl et al (1996)



funsciencedemos on YouTube

#### 2. Science Tutorials

Science tutorials are meant to teach use of a scientific equipment or guide a scientific experiment for pedagogical purposes. When a narrator guides the viewer through each step and provides visual cues that aid the viewer to learn effectively.



A selection of Science YouTubers

#### 3. Science Infotainment

From Beakman's World, Bill Nye, to current day Science YouTubers, science videos and documentaries have become a source of direct entertainment by highlighting the surprising aspects of science and result in a broader understanding of science.



A still from *Mothlight*

<https://stage.pme.uchicago.edu>

### Film-first Science

Often, science exists as a tool and inspiration for the creation of film. The science can range from superficial mentions (such as use of science jargon in *Star Wars*) to intimately linked to the plot (as in *Interstellar*). It can also involve scientific objects, such as manipulation of analog film with moth wings in *Mothlight*. However, films may depict science and scientists in a negative light (e.g., an evil scientist), which may contribute to public growing distrustful and promote harmful stereotypes.

## Course Development

Our plan is to create a three-quarter program comprising a filmmaking class (first quarter), a scientific filmmaking class (second quarter), and a summer capstone. For the scientific filmmaking class in the second quarter, we have the following plans:

### Goals

- Explore how to make films that draw inspiration from science in plot, subject matter, and/or the creative process
- Students are expected to demonstrate proficiency as an independent filmmaker (e.g. filming, editing, sound, color, etc.)

### Format

- 9 weeks (one quarter)
- Film screening (one screening/week, Thursdays evening)
- Post-screening discussion (1:20 hours / week, Tuesday morning), Lecture/studio session (1:20 hours / week, Thursdays morning)
- Screenings each week, with discussions in class
- 3 film projects

### Open Questions

- What films should we screen?
- Scope of films that the students produce?
- How to effectively include the ethics of scientific filmmaking?

### Films in Contention for Class Screenings

Movie	Scientific Concept
<i>Creature From The Black Lagoon</i>	Evolution, 3D
<i>Arrival</i>	Linguistics
<i>Cells At Work!</i>	Biology, Cell Types
<i>Interstellar</i>	General Relativity
<i>Tenet</i>	Entropy, Time Travel
<i>Source Code</i>	Simulation, Brain in a Vat
<i>The Matrix</i>	Simulation, Programming
<i>Don't Look Up</i>	Scientific Discourse
<i>Annihilation</i>	Mutation and Life
<i>Her</i>	Virtual Assistants
<i>The Imitation Game</i>	Cryptography
<i>Waking Life</i>	Dreams and Meaning
<i>Chernobyl</i>	Science Mishap
<i>Three Body Problem</i>	Chaos Theory
<i>Ex Machina</i>	Artificial Intelligence
<i>The Man from Earth</i>	Anthropology
<i>Jurassic Park</i>	Genetics
<i>Terminator 2</i>	Robotics
<i>A Serious Man</i>	Quantum Science
<i>A Beautiful Mind</i>	Cryptography
<i>Sunspring</i>	AI Generation
<i>Mermaid: The Body Found</i>	Fake Scientific Evidence
<i>Mothlight</i>	Insect parts attached to film
<i>A Trip to the Moon</i>	First Science Fiction Film

Suggestions Welcome!

## Conclusions

In this poster, we illustrate the complex interaction between film and science with several examples, and how one can systematize these relations. With a detailed understanding of the concepts at play, we have the groundwork for a one quarter course on scientific filmmaking. For more information, contact Abhishek Sharma at [abhisheksharma@uchicago.edu](mailto:abhisheksharma@uchicago.edu) and STAGE Lab team at [stagelab@uchicago.edu](mailto:stagelab@uchicago.edu)

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