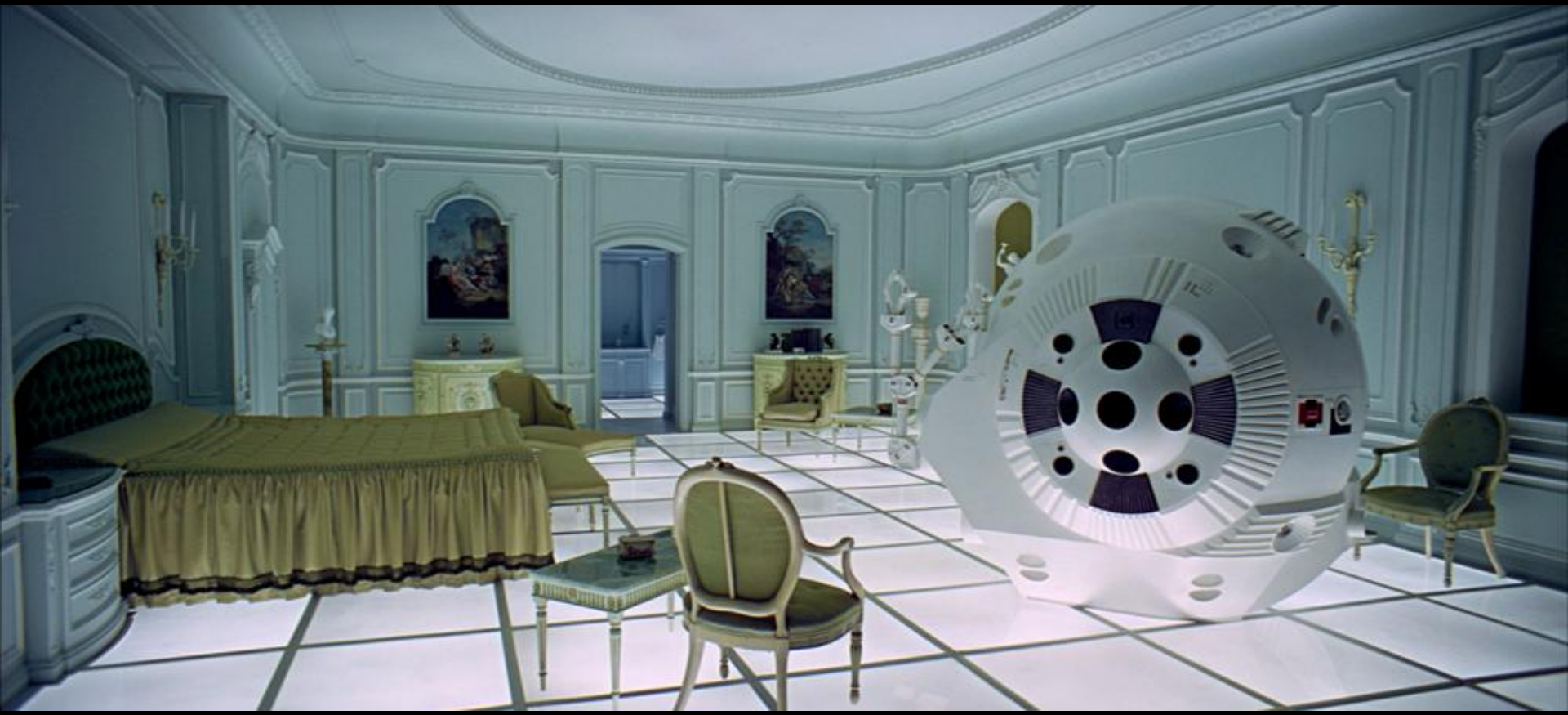
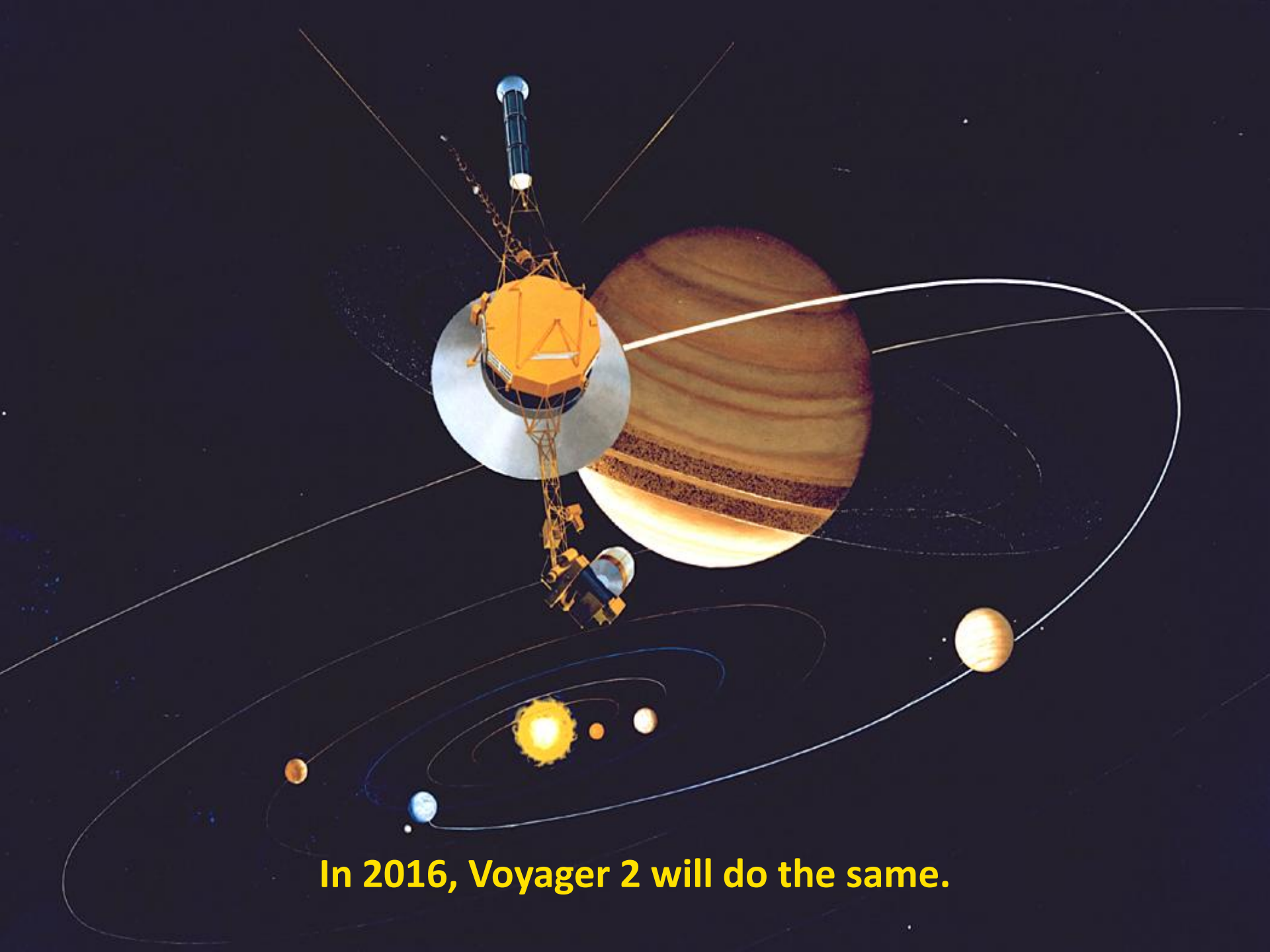
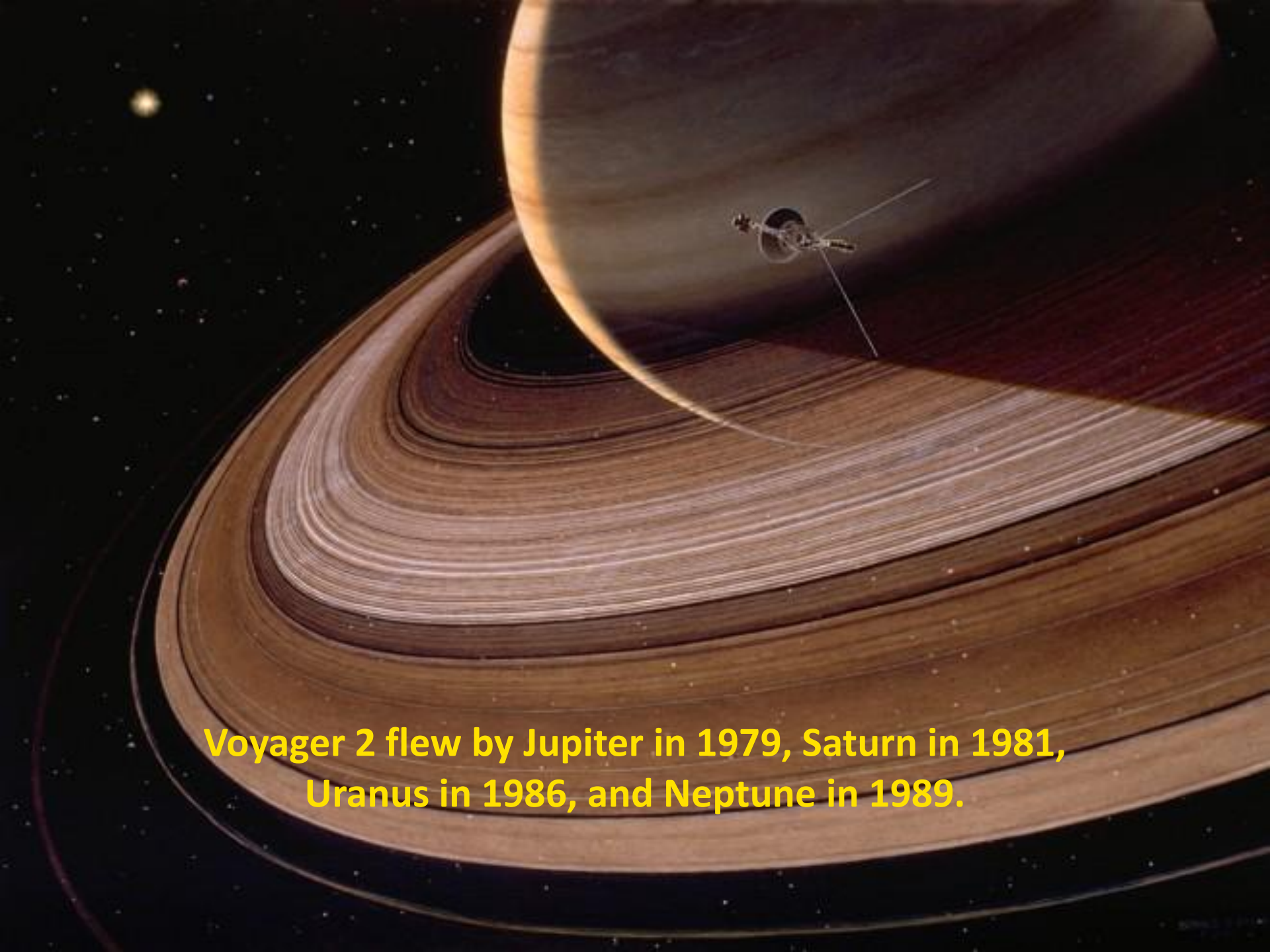
Four Fantasies



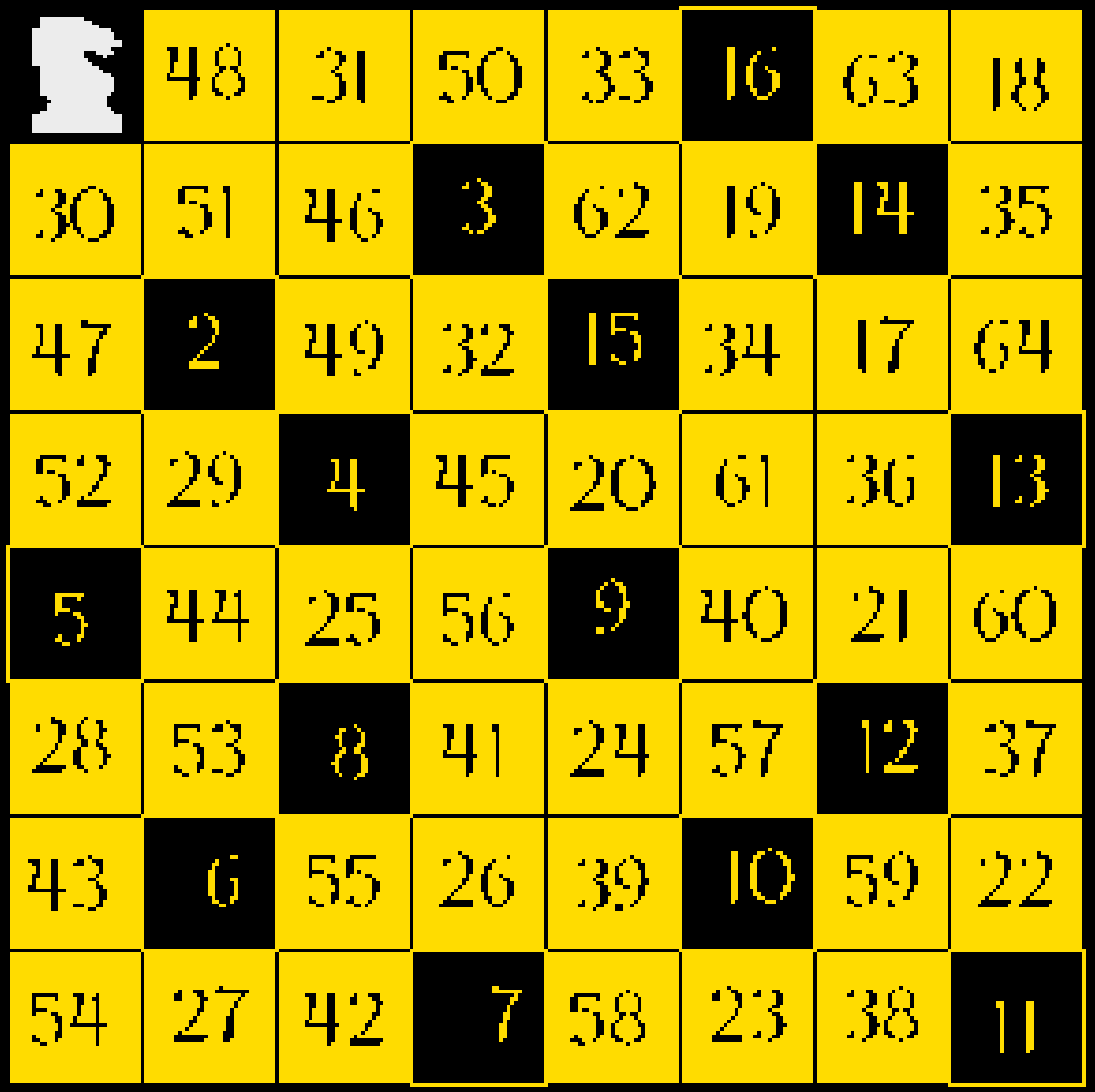
On September 12, 2013,
NASA announced that Voyager 1 had crossed the heliopause and entered interstellar space.


In 2016, Voyager 2 will do the same.

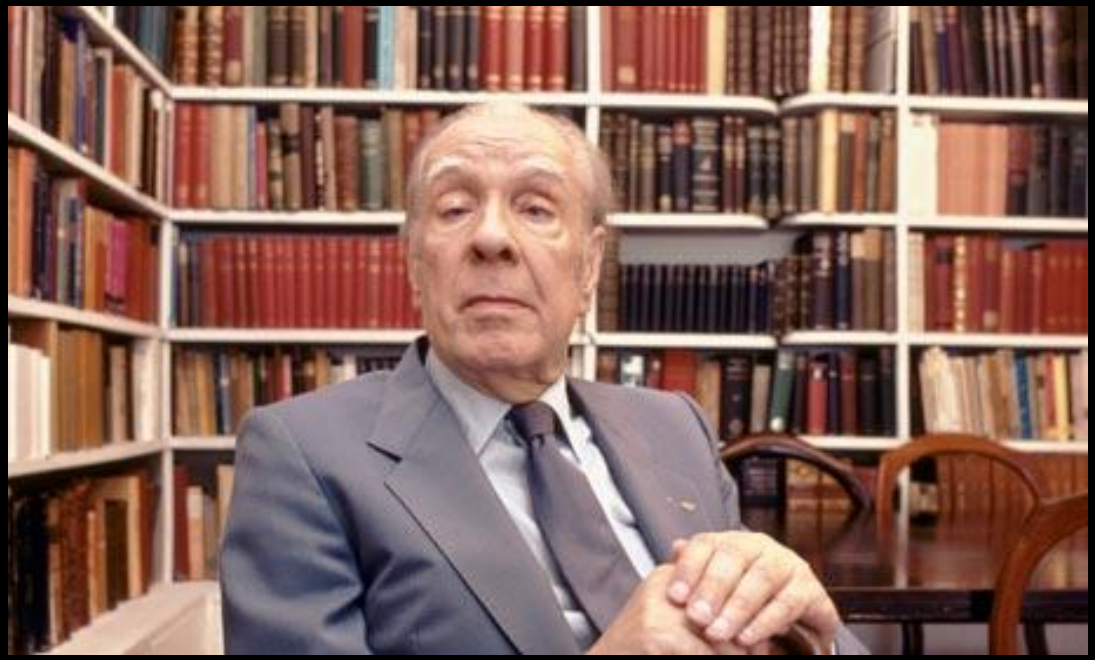


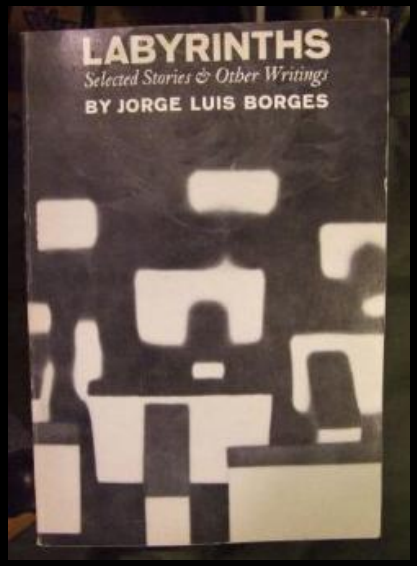
Voyager 2 flew by Jupiter in 1979, Saturn in 1981,
Uranus in 1986, and Neptune in 1989.

Shortly after the Jupiter flyby in 1979…



…I got the idea for a Voyager 0, another kind of grand tour.

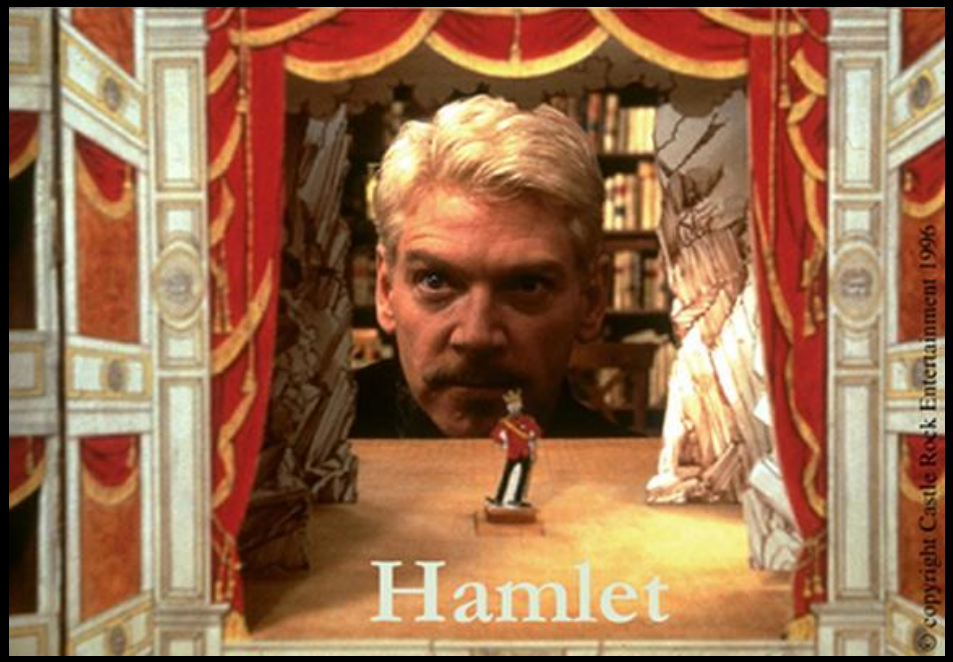




The idea was inspired by Jorge Borges, an Argentine writer of short fantasy stories who once said there were four ways to create fantasy and destroy reality:

Four Fantasies

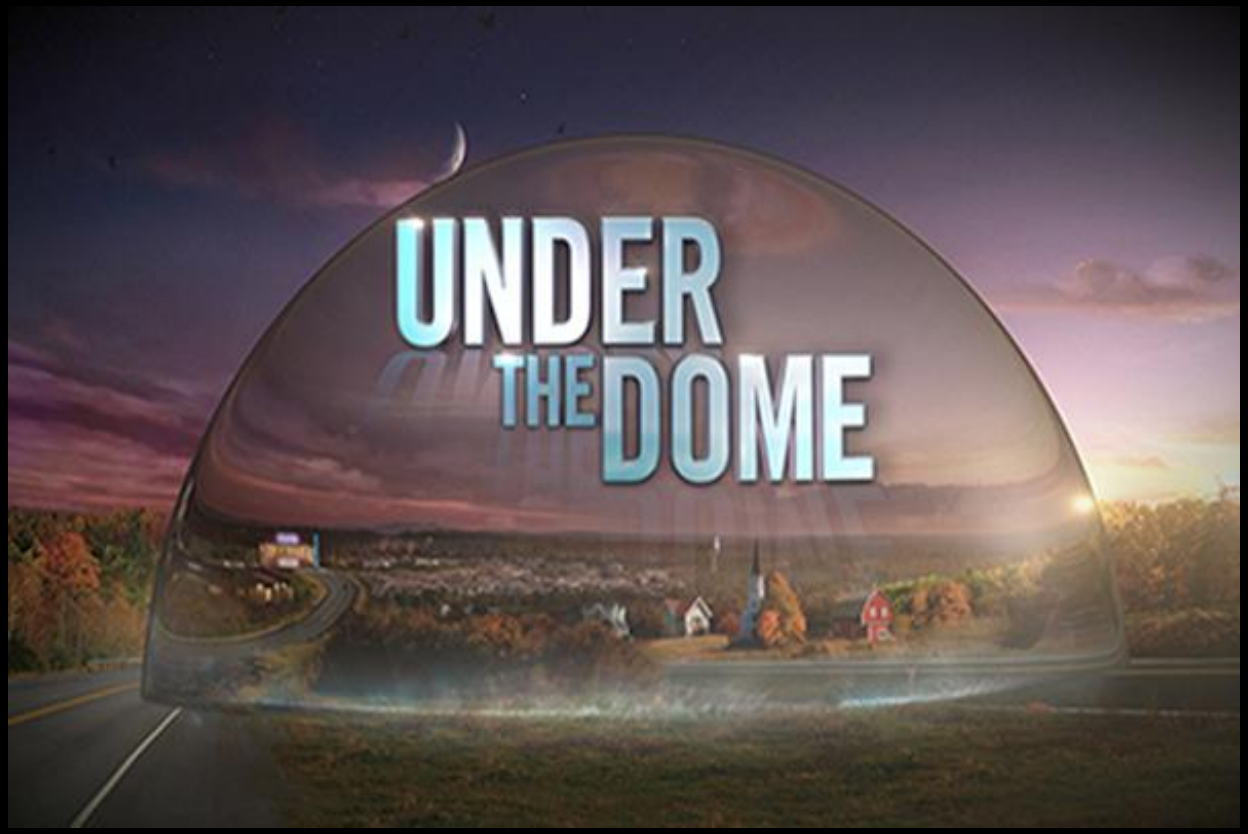
www.t-bag.org



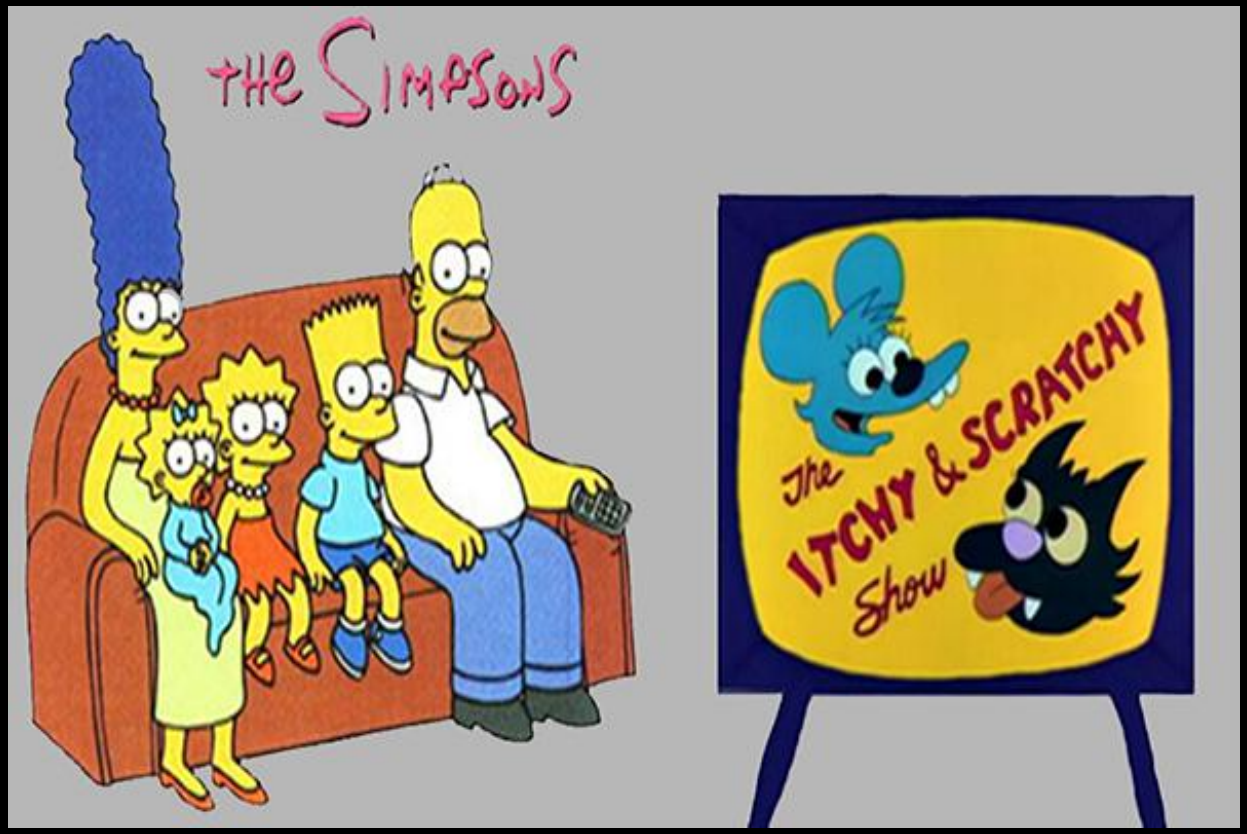
Most of us, who read books, or watch TV and movies, are familiar with these fantasy procedures.

Shakespeare made use of the play within the play in his *Hamlet* and *Midsummer Night's Dream*.

***Don Quixote*, *Steppenwolf*, and *The French Lieutenant's Woman* each contains an inner novel about the main character in the outer novel.**

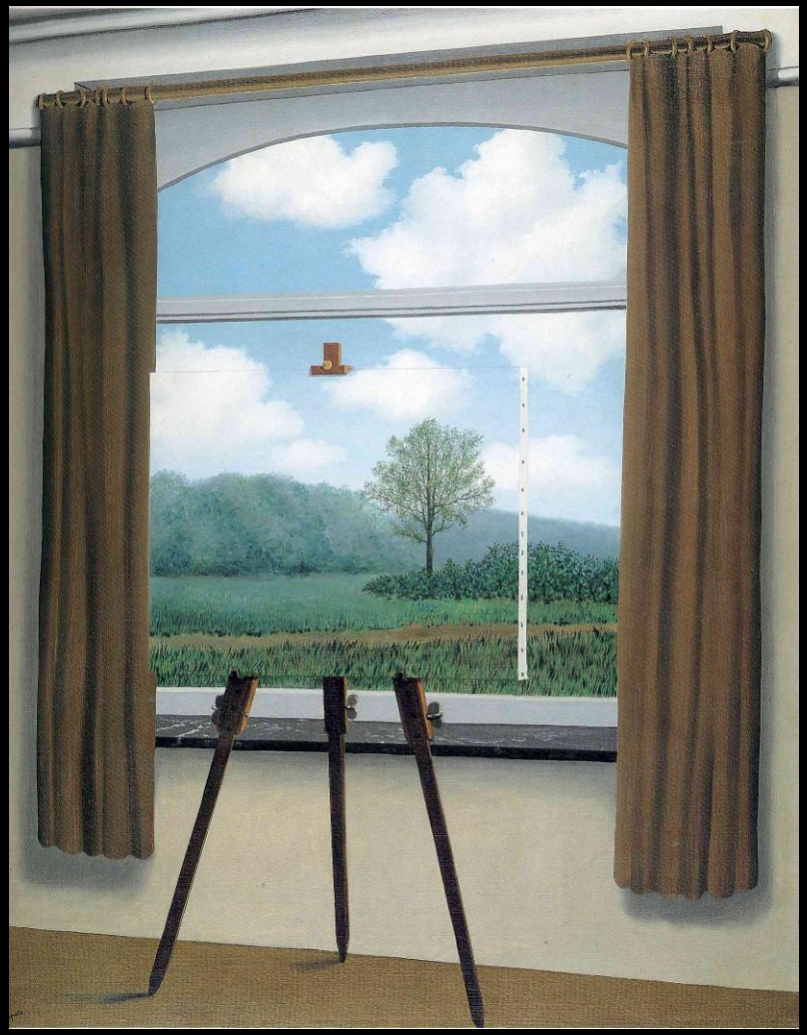


Stephen King's *Under the Dome* is a microworld reflecting the outer world.

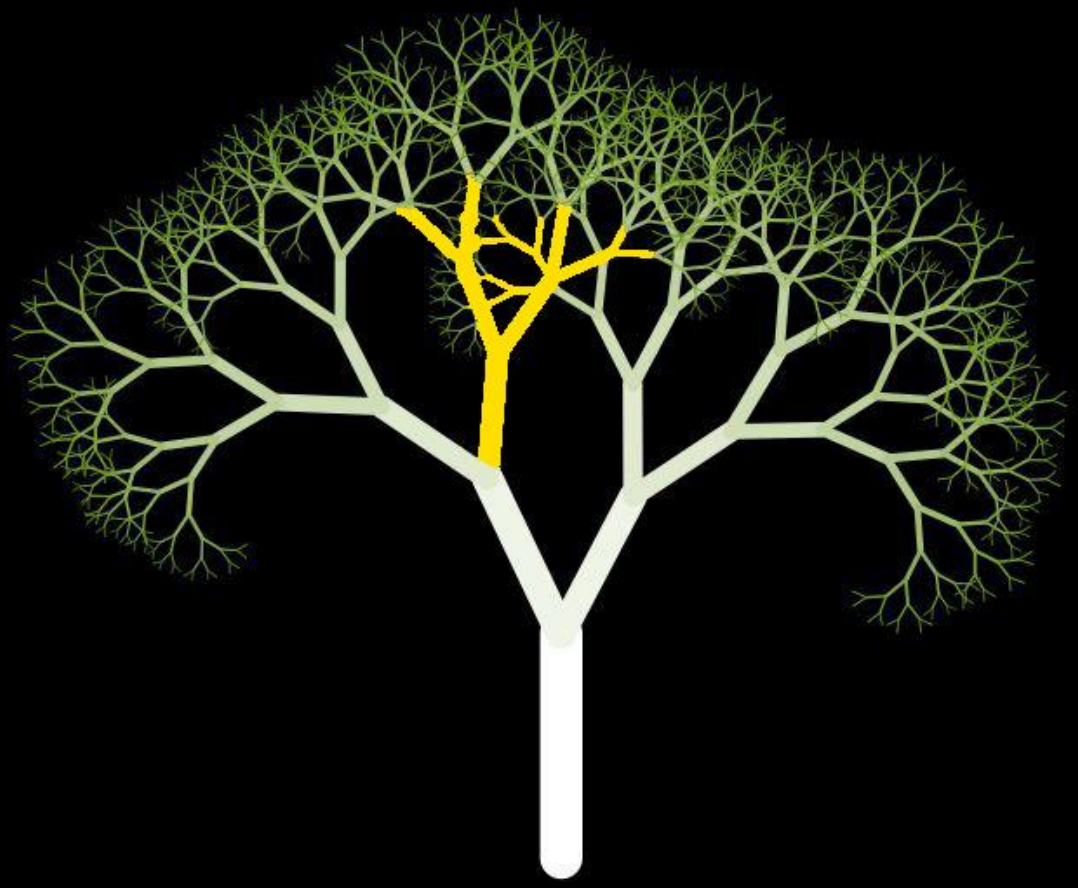


Itchy and Scratchy **is a cartoon that reflects the inappropriate humor of the Simpson's cartoon world.**

Each of these stories contains a smaller story that somehow mirrors or comments on the larger story.



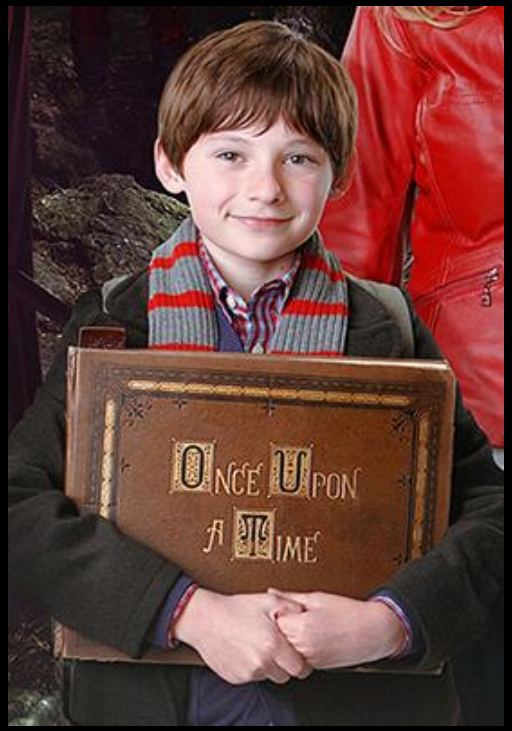
Today, we call a similarity between parts and wholes a fractal.



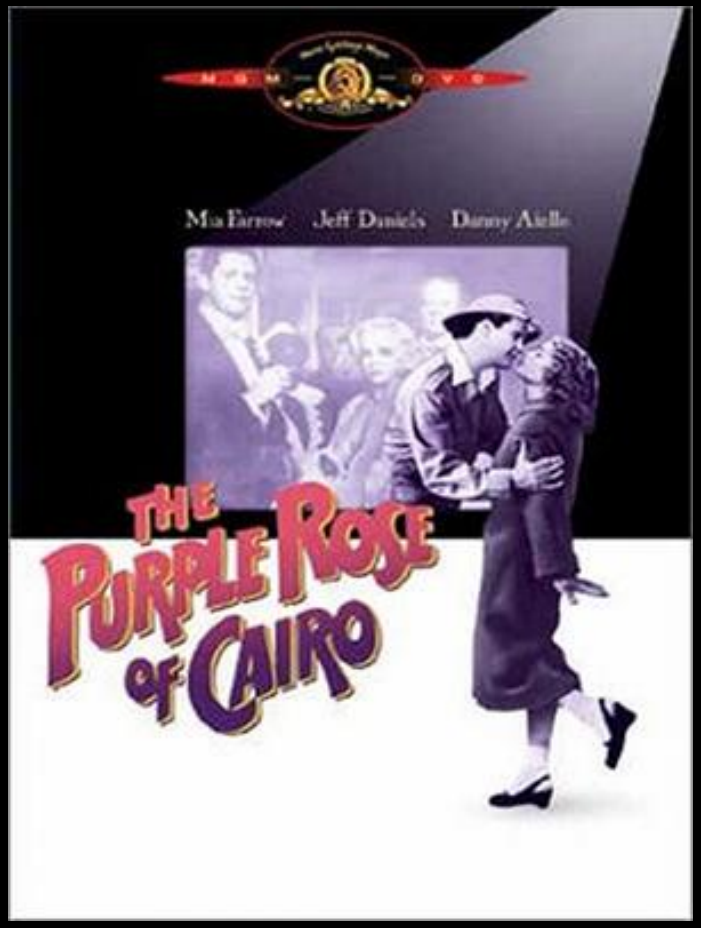
A branch on a tree is an example of the part imitating the whole tree.

We see contamination of reality by a dream when Alice falls down the rabbit hole…

…Dorothy lands in Oz…

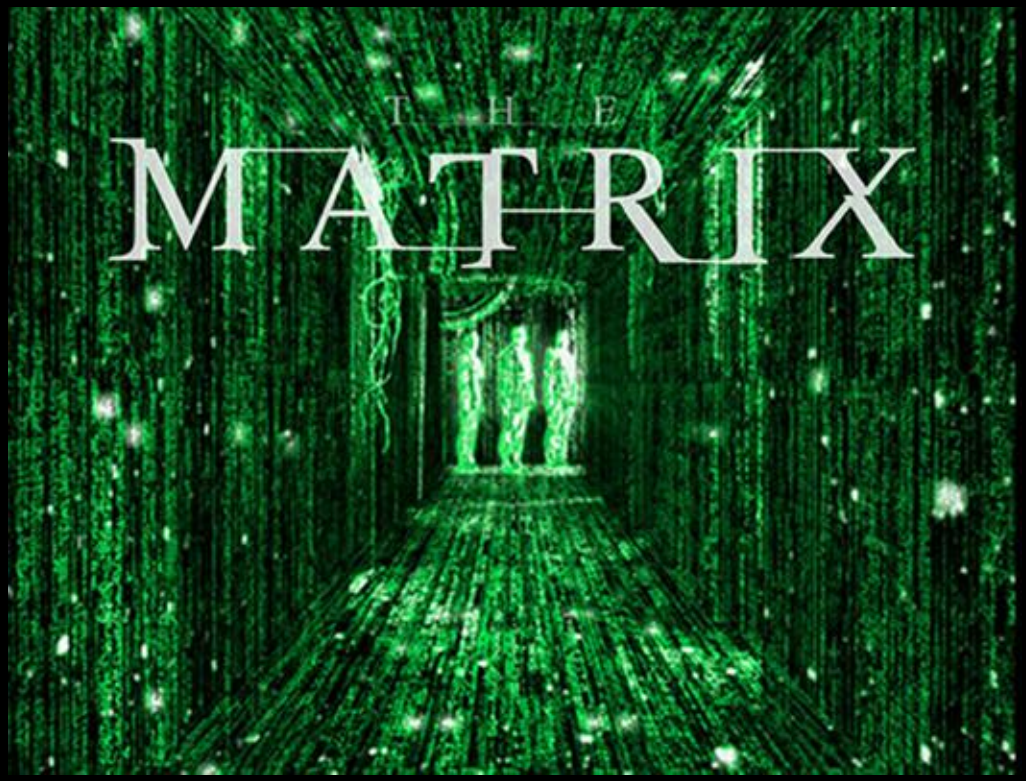


…and Henry creates Storybrooke in *Once Upon a Time.*



Woody Allen has applied all four procedures in his movies. In his *Purple Rose of Cairo*, a movie star steps out of the movie and kisses a moviegoer.

2001: Space Odyssey **uses all four procedures in one movie. Interjecting a space pod into an 18th century bedroom asks the question which is dream and which is reality?**



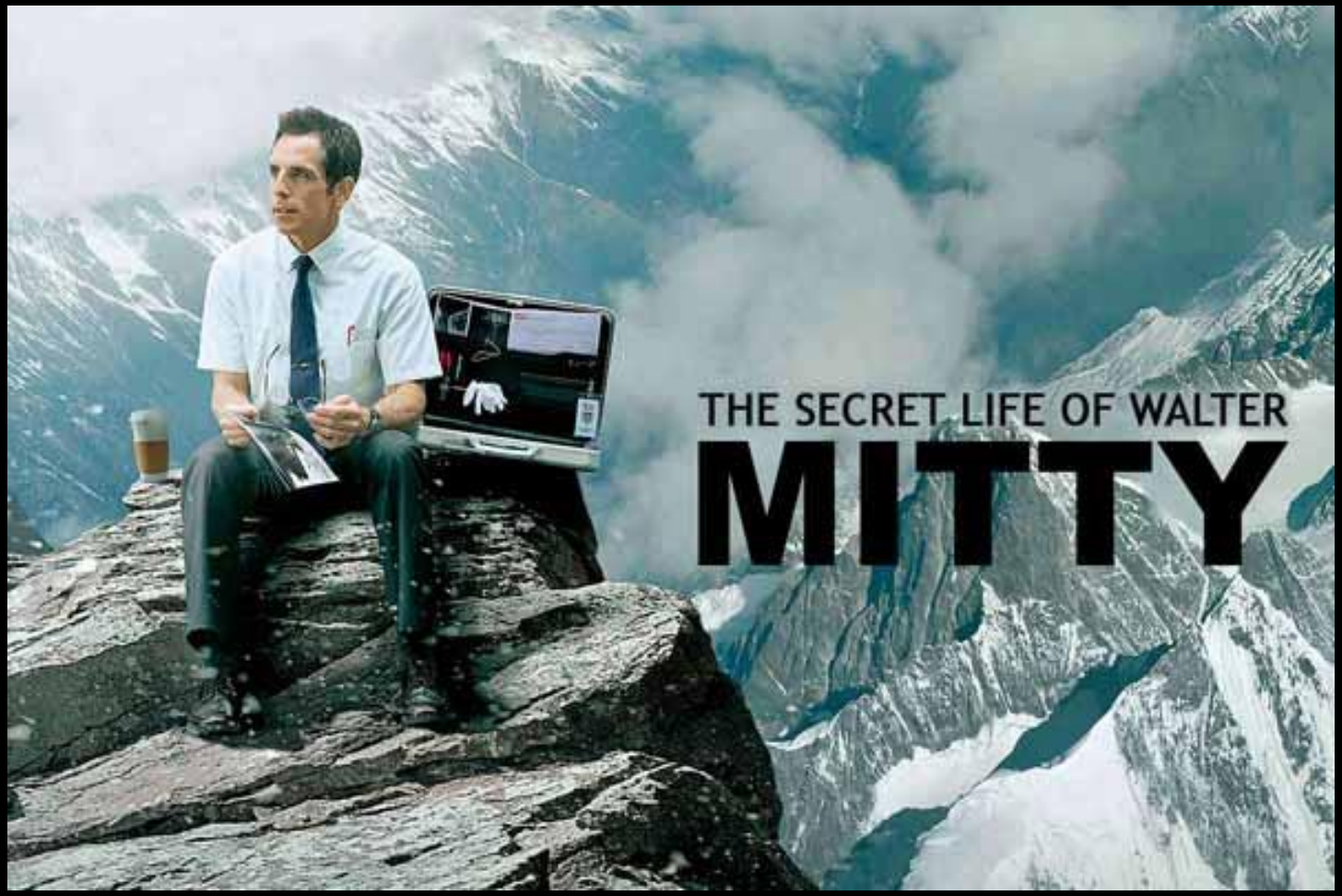
This question is the main theme of *The Matrix*…

…and many others that have preceded and followed it.

Sometimes the dreams are nightmares as seen in *Nightmare on Elm Street...*

…and *The Walking Dead.*

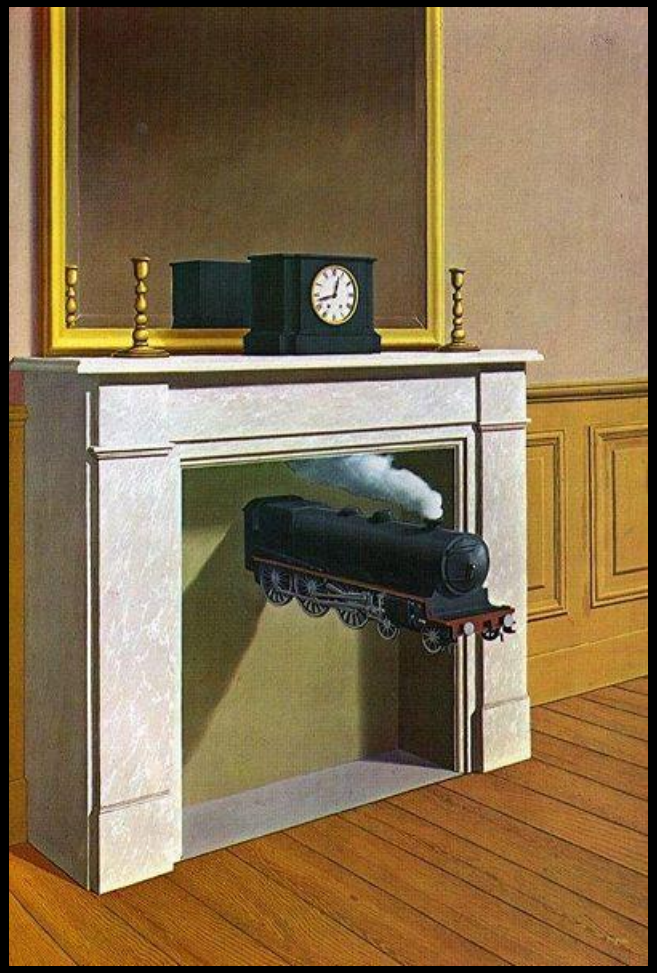
Every ghost story is an example of a dream world contaminating reality.



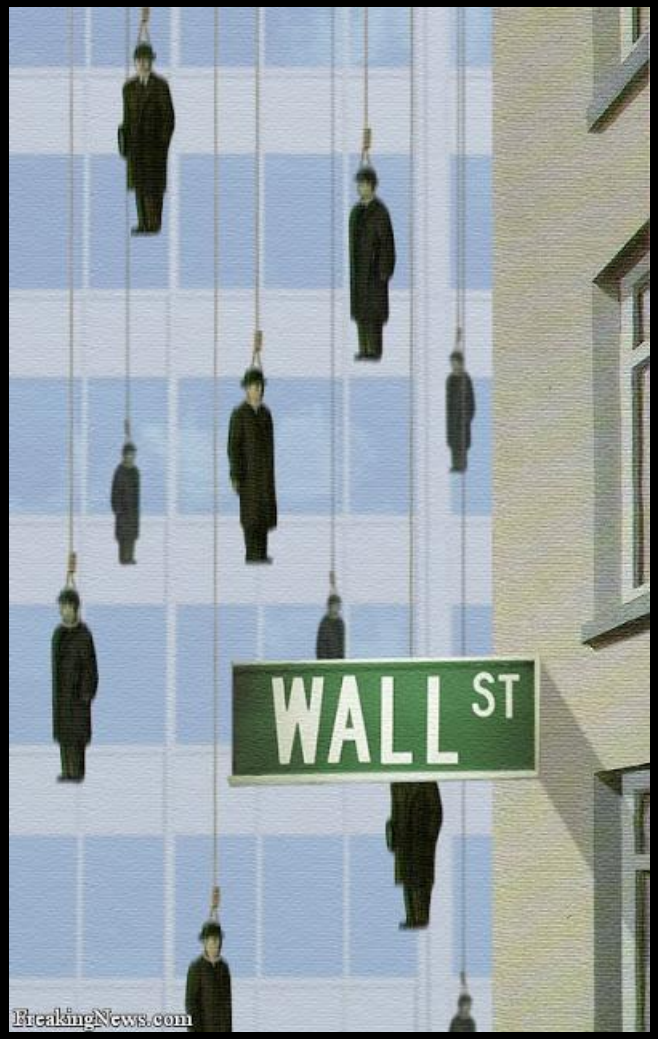
An extra dimension juxtaposes itself onto the ordinary world.

Time travel is relatively new to fantasy.

Before H.G. Wells' *Time Machine,*
most people lived in rural areas where time was circular
and the same thing occurred every day.



After Isaac Newton, time became linear
and could be measured as you would a straight line,
not with a yard stick, but with a digital clock.



This is obvious to us who live in a city and follow schedules…

…but not so obvious to those who lived a thousand years ago and followed daily, monthly, and yearly cycles.

We see a variation on circular time in *Groundhog Day*.

There Have Been Many Time Machines

A Christmas Carol, **a four poster bed**
A Wonderful Life**, an angel's bell**
Back to the Future**, a DeLorean**
Midnight in Paris**, an antique taxi**
Dr. Who**, a police box**
Hot Tub Time Machine**, you guessed it**
On a Clear Day**, a hypnotist**
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2001**, a chimpanzee with a bone**
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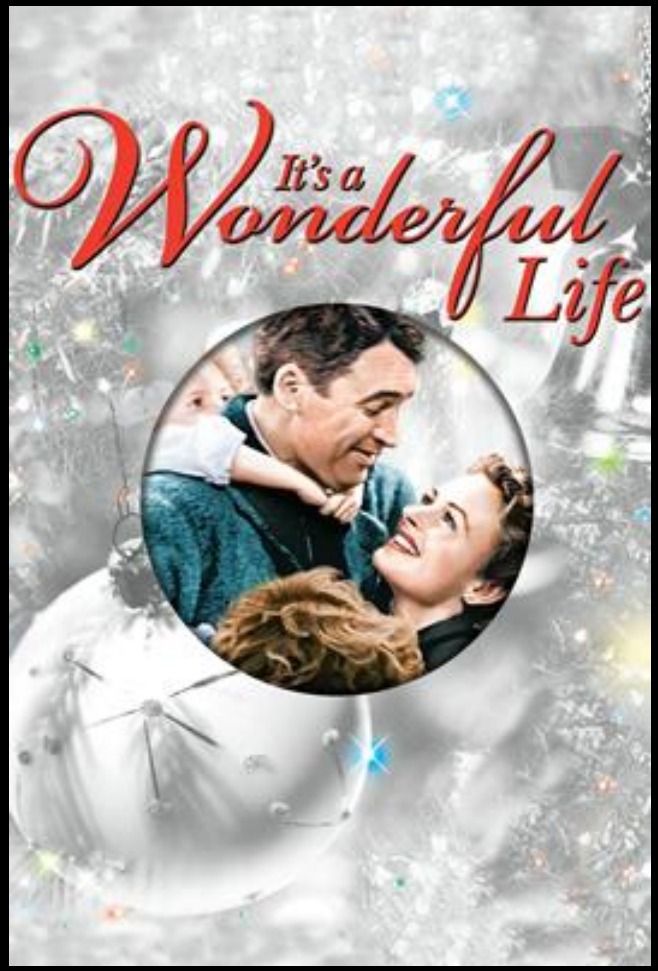

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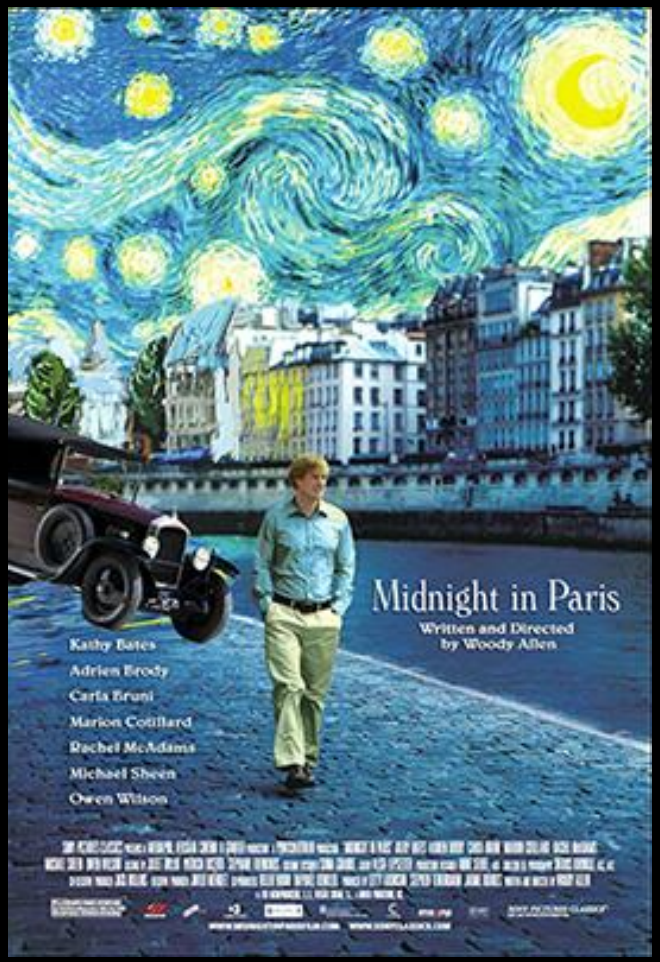

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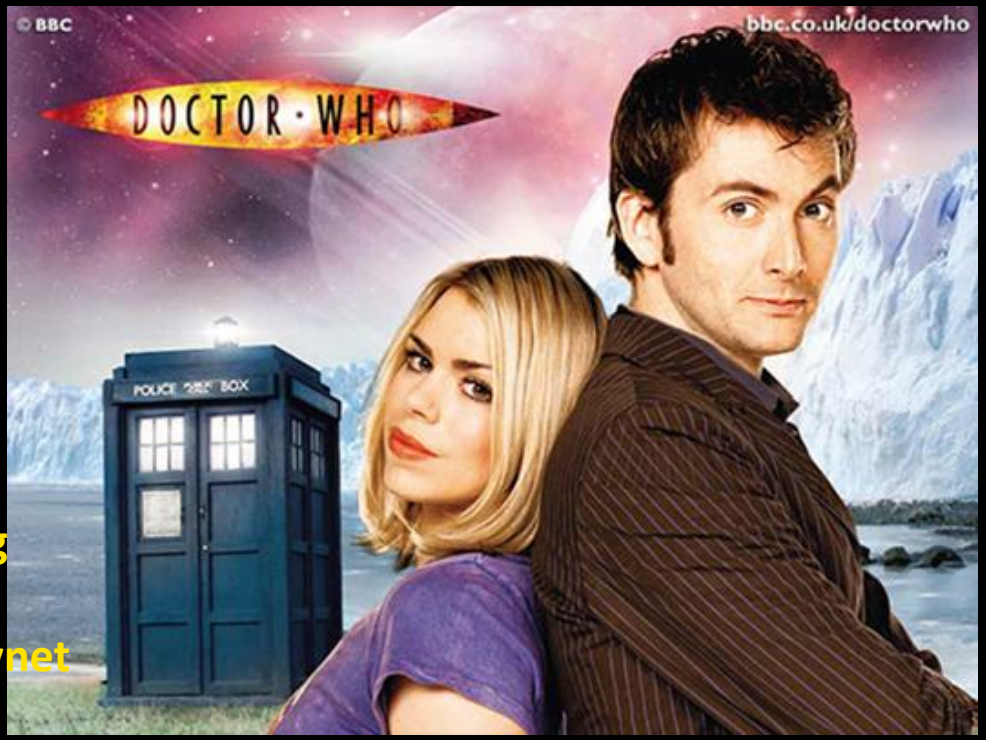

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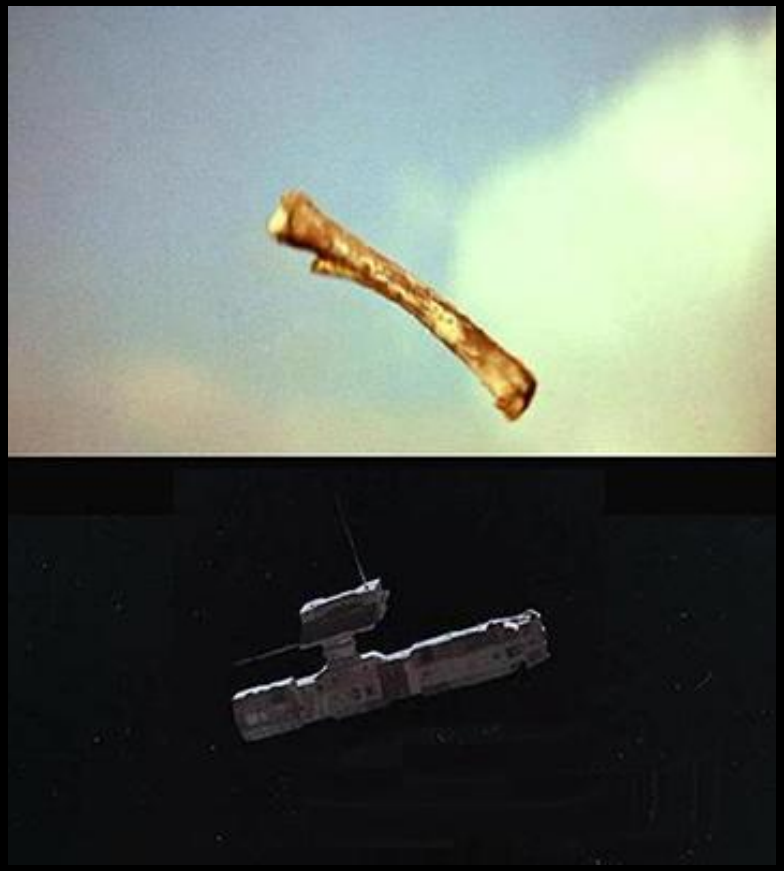

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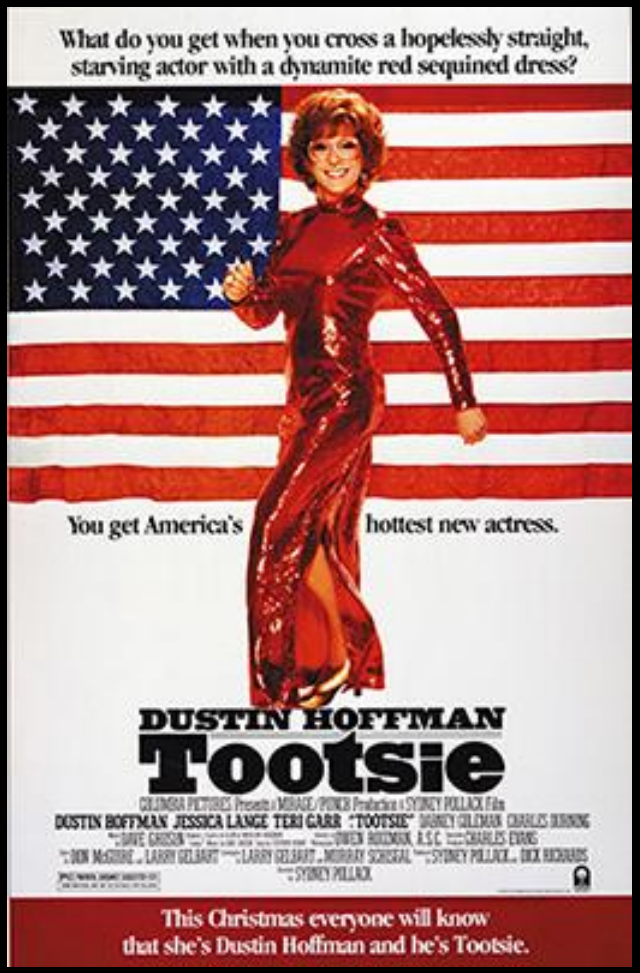
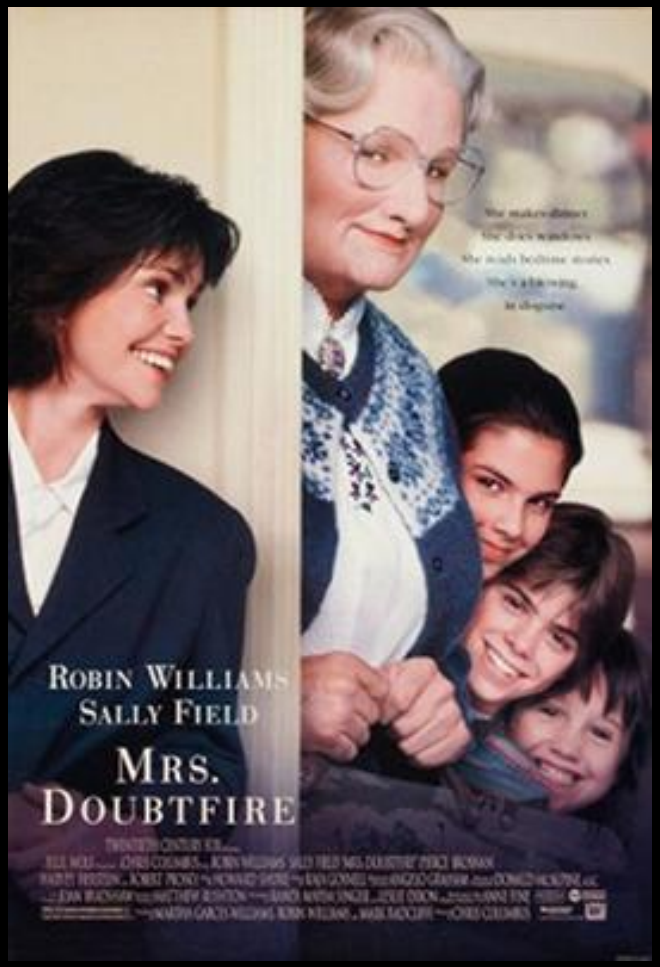
The double is a concept based on the question of identity.

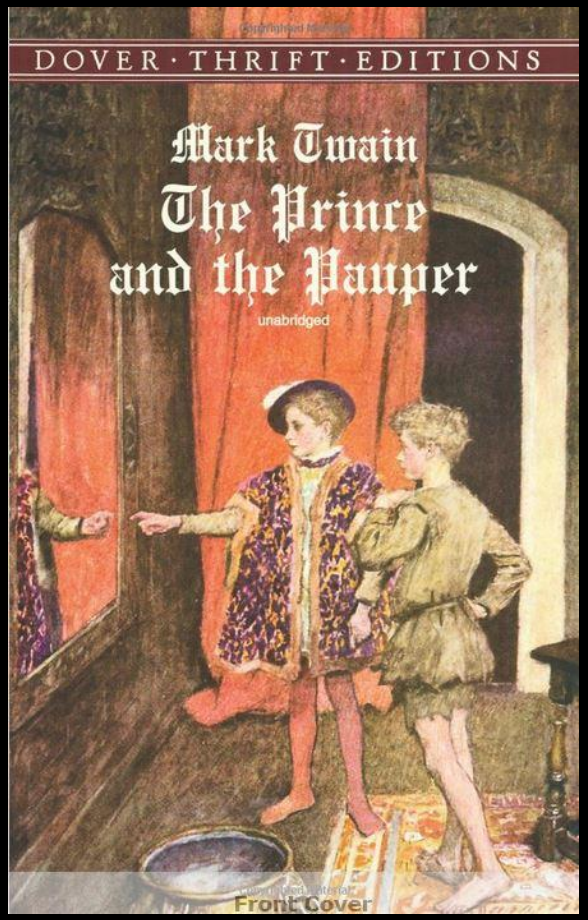


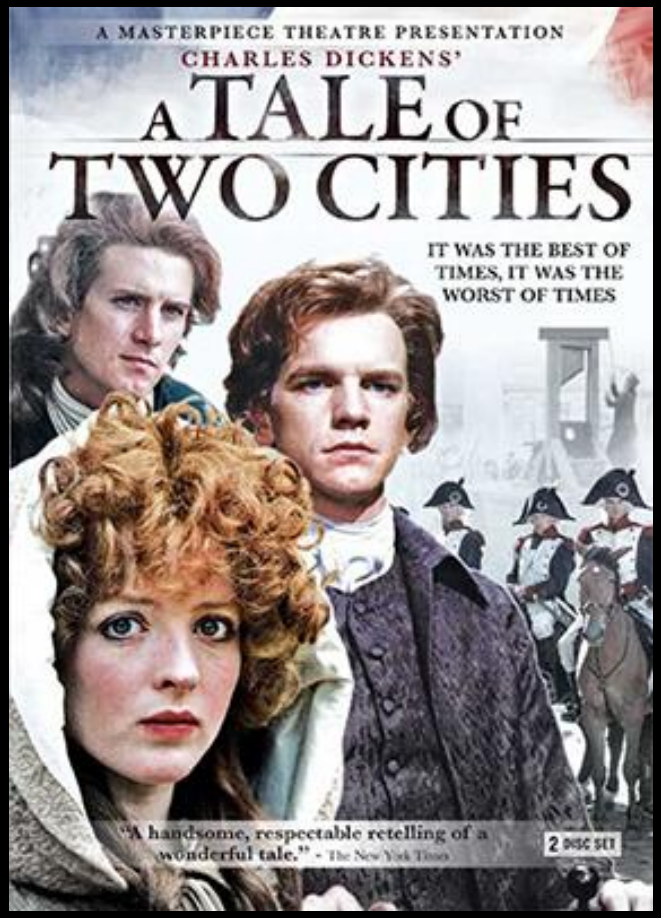
If we assume that no two things or people are identical, then a double is a fantasy.

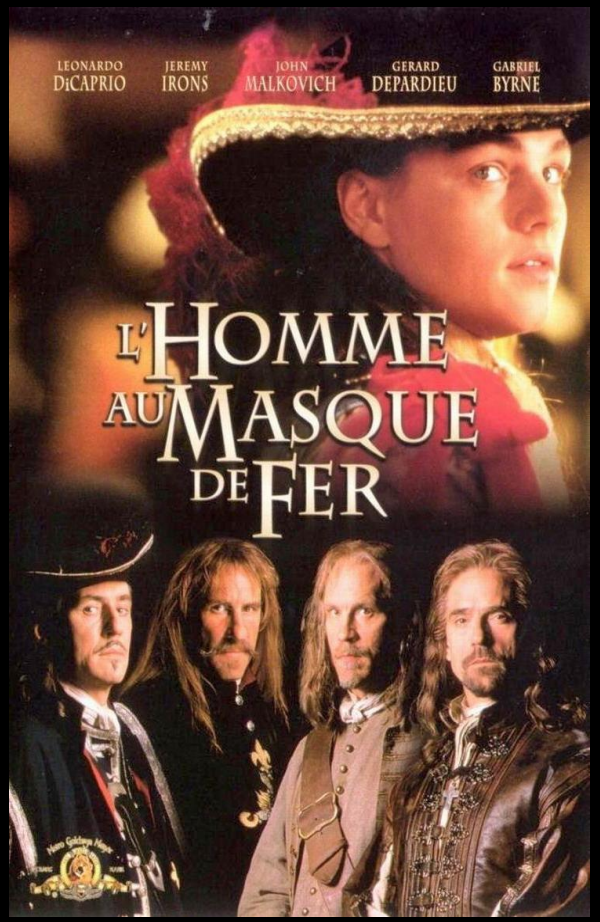


Any hint of a double, or a secret identity, adds a touch of the fantastic to a story.

In *Midsummer Night's Dream*,
Bottom's secret identity is a jackass.







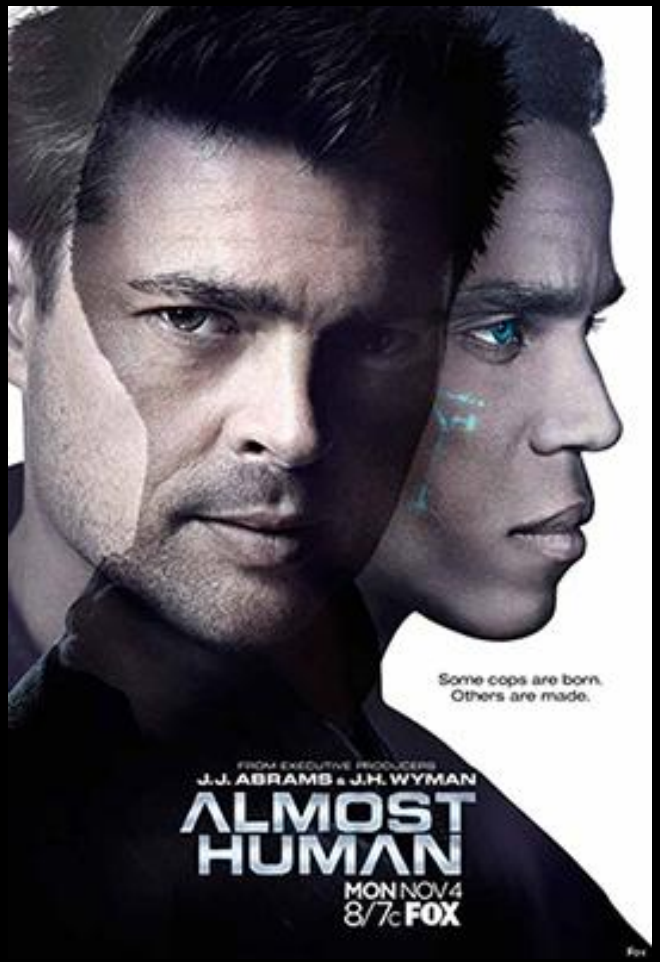
Double identities were popular in 19th century novels like *The Prince and the Pauper, Tale of Two Cities, Man in the Iron Mask…*

…and of course, *Dr. Jekyll and Mr. Hyde*.

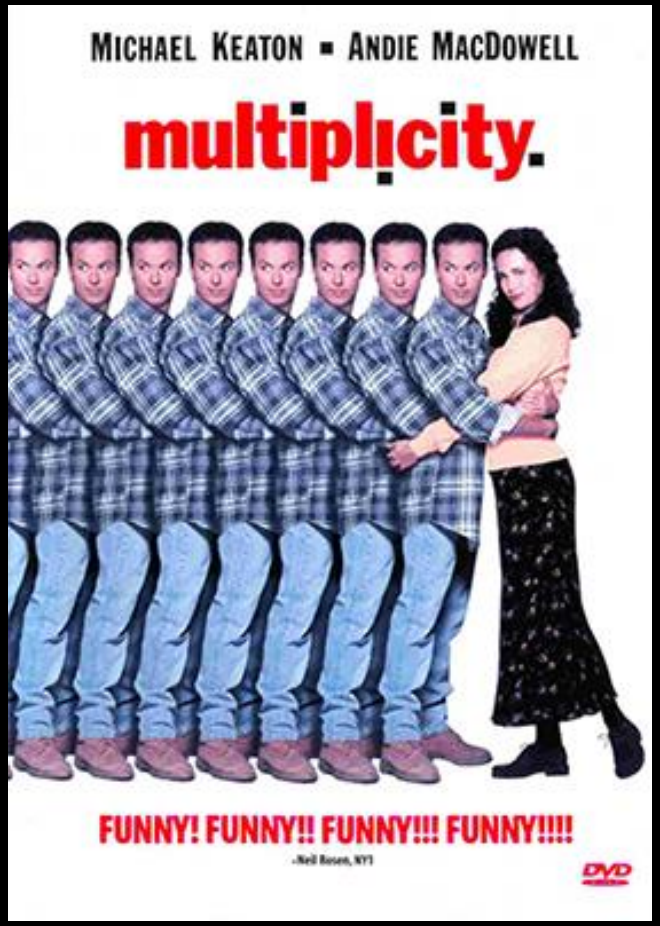
Today we have superheroes with secret identities…

…or anti-heroes with secret identities
as in the latest vampire and werewolf movies.

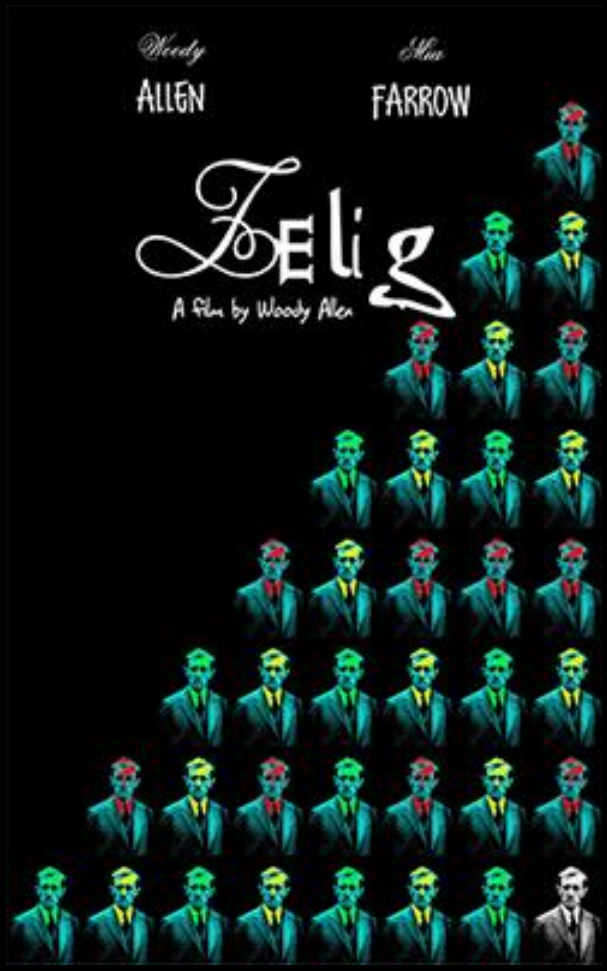
***Cloud Atlas* is about reincarnation, another form of doubling.**



And then there are robot and clone movies…

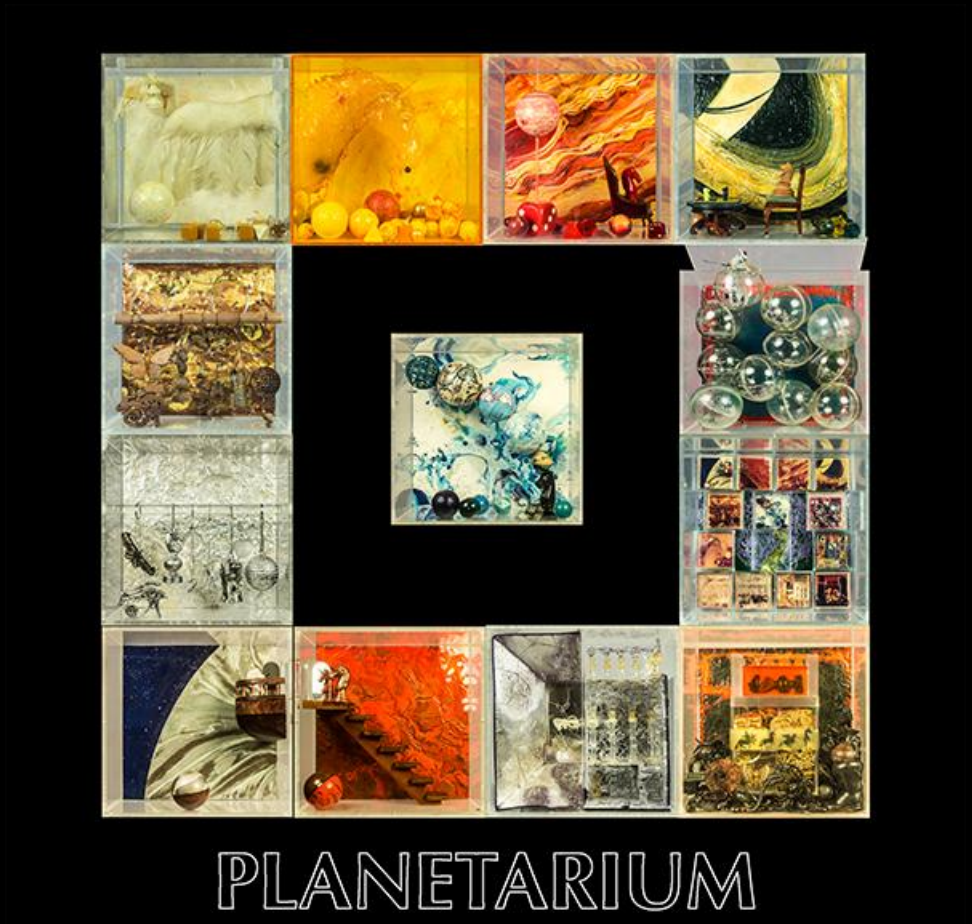


…the funniest being *Multiplicity*.

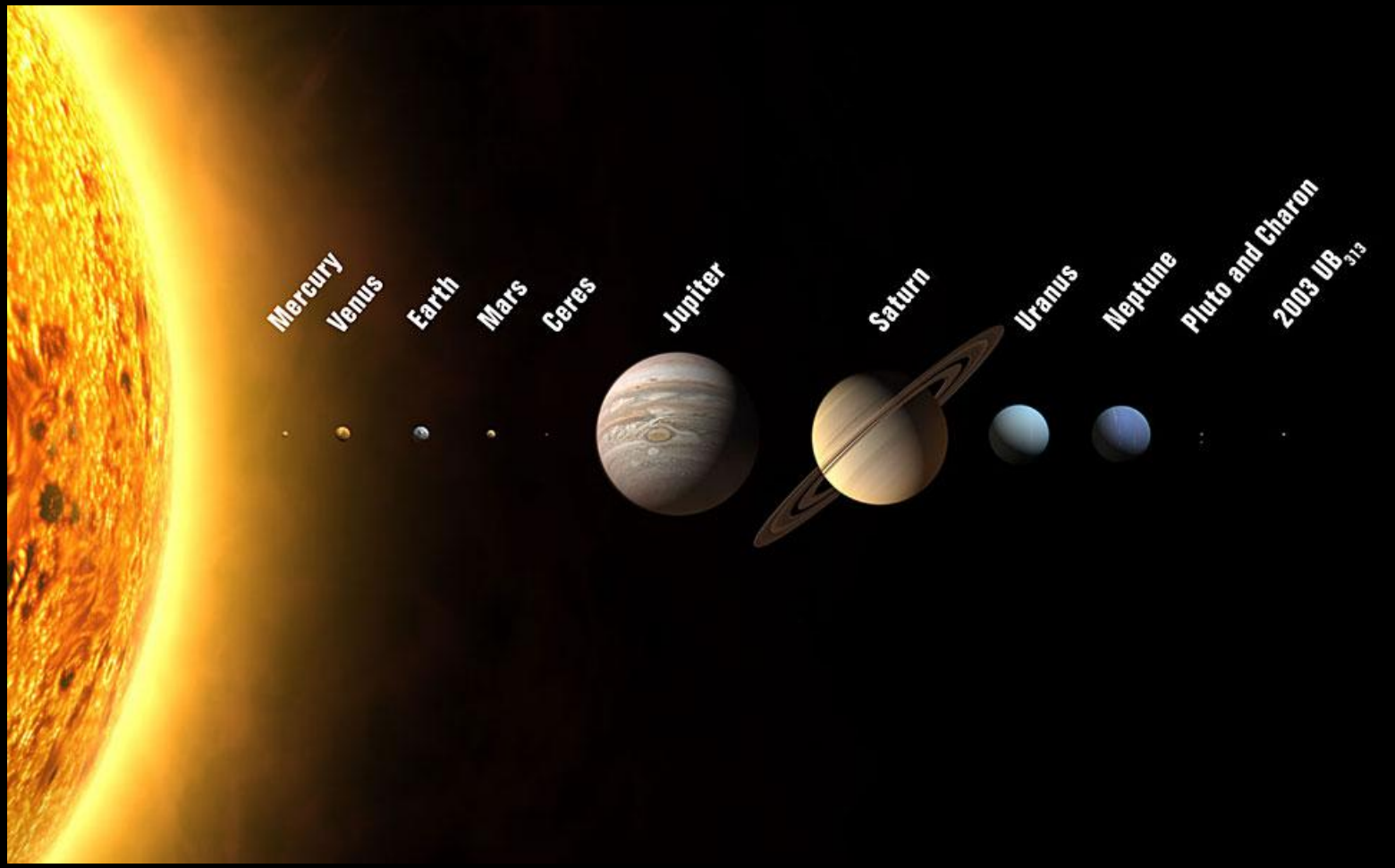


My favorite is Woody Allen's *Zelig*.

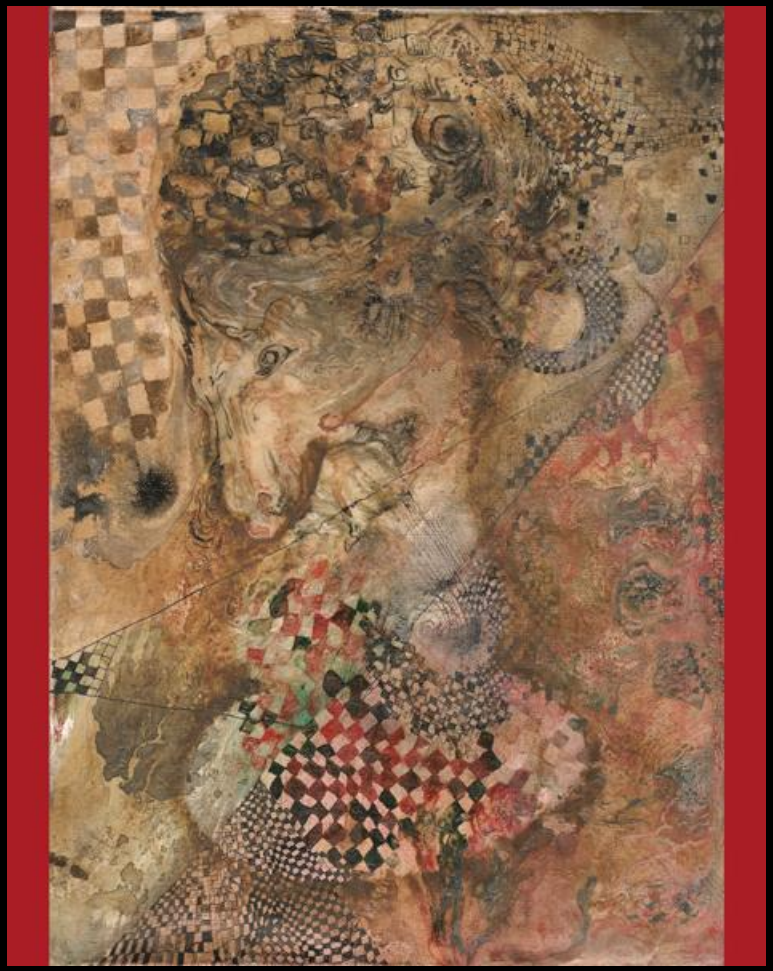
But the prettiest is *Ladyhawke*.



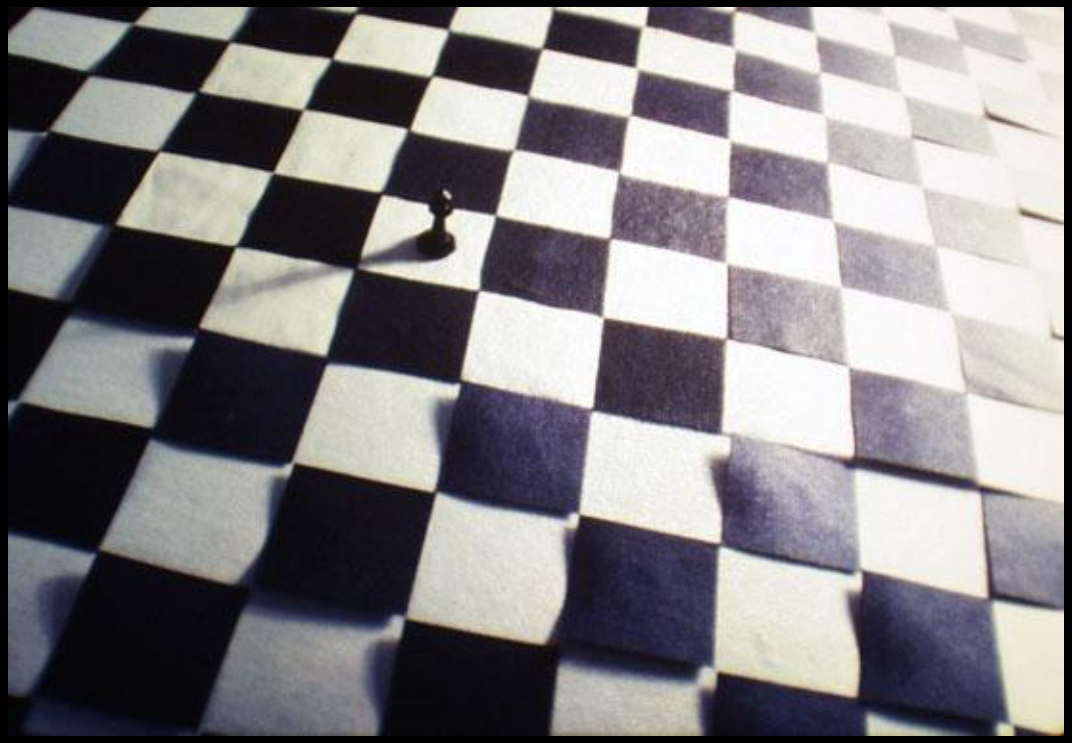
So how does all this relate to my Planetarium?



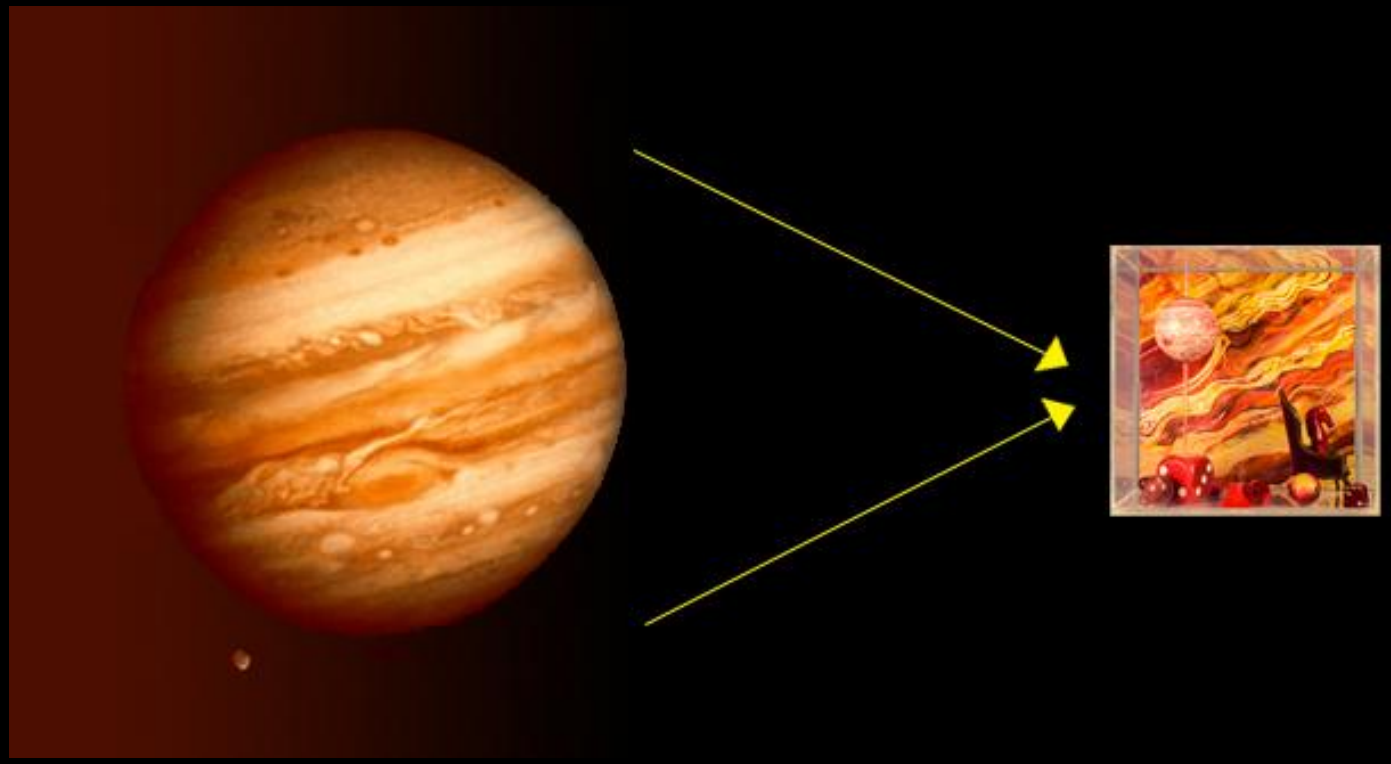
My Planetarium is a response to the Voyager 2 mission that toured the four largest solar planets back in the 1980's.



However, rather than a space craft, my tourist is a chess knight touring squares on a 3 dimensional chess board.



Originally, there were to be 64 squares divided into 5 categories, but the project morphed …



… from micro-sizing to macro-sizing —
shrinking large spheres to small semi-cubes…

… became magnifying natural phenomena into people-sized pentagons.

My Planetarium is a fantasy voyage, and as Borges pointed out, you cannot have fantasy without applying at least one of the four fantasy types.

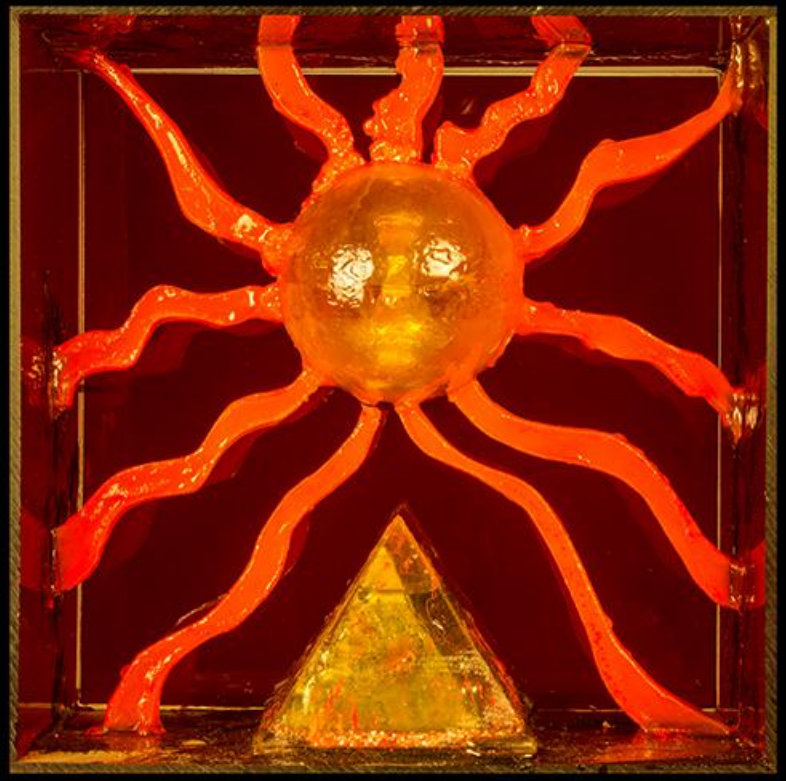
ELEMENTIA

Notice that each of the squares projects a vision onto ordinary objects like you would find in a thrift store such as Goodwill.

Visions like dreams emerge from our imagination.

AIR

For many of us, visions are as easy to come by as dreams.



They usually occur when you first wake up in the morning.

But projecting your dream onto reality is never as easy as the dream itself.

VENUS

MARS

Each square contains a small spherical version of a planet as well as a corresponding square background painted to resemble a NASA photo.

JUPITER

SATURN

Also, the objects in each square reflect the colors of the painted background.

Thus, the part reflects the whole.

MOON

SUN

The double is most obvious in the chess knights themselves…

MERCURY

CERES

…they are each different,
yet enough alike that you see similarity.

In my earlier years, I was somewhat obsessed with chess knights and squares.

Notice that the centaur's head replaces the horse's head.

The chess knight negates the centaur in my mythology.
What could that mean?

Time travel is a challenge in still media.
Juxtaposition of objects from different time periods is the simplest solution.

Each square juxtaposes a NASA image with those from antiquity and the middle ages — except for Persephone, a totally imaginary planet.

The Planetarium is a fusion of classical myths…

…medieval reliquaries…

…ancient astrology and modern astronomy.









My main influences have been ancient storytellers, anonymous craftsmen, Jorge Borges, Joseph Cornell…

…and Voyager 2 images.

ZERMELO-FRAENKEL-SKOLEM AXIOMS FOR SET THEORY

1. AXIOM OF EXTENSIONALITY

$\forall u\,(u \in X \equiv u \in Y) \Rightarrow X = Y.$

Two sets are equal if and only if they have the same members.

2. AXIOM OF UNORDERED PAIRS

$\forall a \forall b \exists c \forall x\,(x \in c \equiv (x = a \vee x = b)).$

The pairing of two sets is also a set.

3. AXIOM OF SUBSETS

$\forall X \forall p \exists Y \forall u\,(u \in Y \equiv (u \in X \wedge \varphi\,(u, p))).$

Any subset of a set is also a set.

4. AXIOM OF THE SUM SET OR UNION

$\forall X \exists Y \forall u\,(u \in Y \equiv \exists z\,(z \in X \wedge u \in z)).$

The union of sets is also a set.

5. AXIOM OF THE POWER SET

$\forall X \exists Y \forall u\,(u \in Y \equiv u \subset X).$

The set of all subsets of a set is also a set.

6. AXIOM OF INFINITY

$\exists S\,[\emptyset \in S \wedge (\forall x \in S)\,[x \bigcup \{x\} \in S]].$

There exists an infinite set.

7. AXIOM OF REPLACEMENT

$\forall x \forall y \forall z\,[\varphi\,(x, y, p) \wedge \varphi\,(x, z, p) \Rightarrow y = z]$
$\Rightarrow \forall X \exists Y \forall y\,[y \in Y \equiv (\exists x \in X)\,\varphi\,(x, y, p)].$

The image of a set is also a set.

8. AXIOM OF REGULARITY

$x \neq \emptyset \Rightarrow \exists\, y\,(y \in x \wedge y \bigcap x = \emptyset).$

Every nonempty set is disjoint from one of its elements, therefore no set contains an infinitely descending membership sequence, all sets contain a minimal element such that this element shares no member with the set, and no set may be a member of itself.

9. AXIOM OF CHOICE

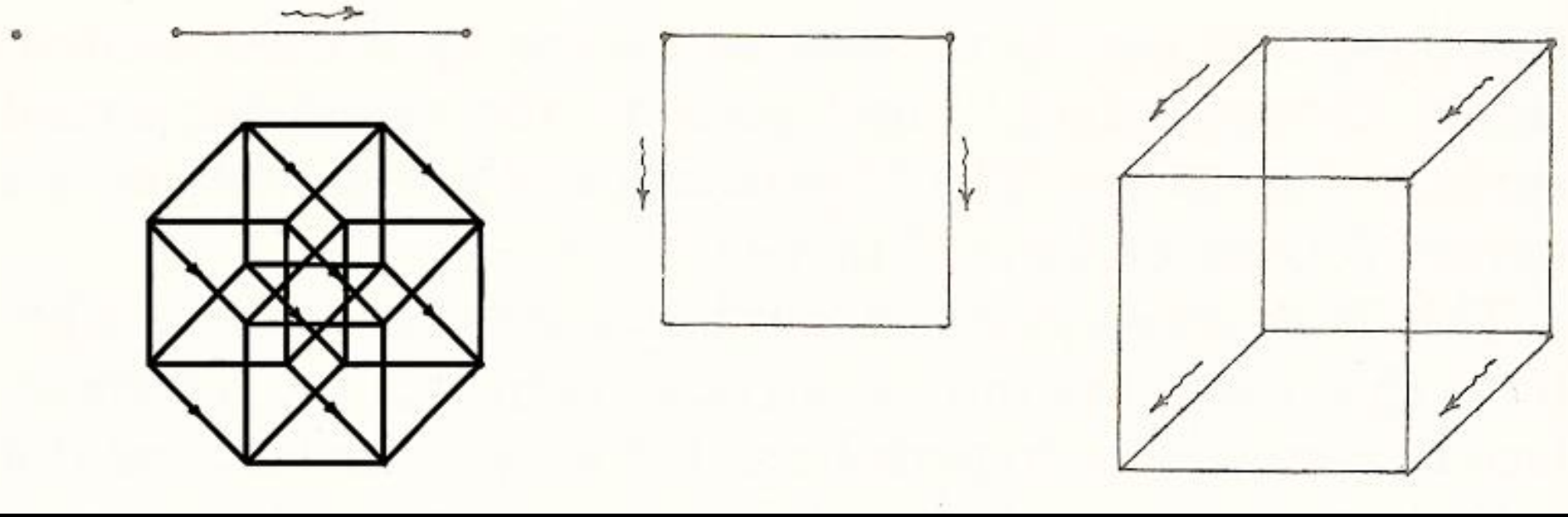
$\forall x \in a \exists A\,(x, y) \Rightarrow \exists y \forall x \in a\, A\,(x, y\,(x)).$

Given any set of mutually disjoint nonempty sets, there exists at least one set that contains exactly one element in common with each of the nonempty sets.

Set Theory Axioms

Mathematics being the most imaginative of all disciplines, we can expect correspondences between basic math concepts and Borges' four fantasies.

Dimensions



We see the relationships of wholes to parts in set theory, exploration of dimensions in topology, concepts of identity in rules of logic, and of course linear time cannot exist, let alone time travel, without numbers.

Peano Axioms

1. Zero is a number.
$0 \in \boldsymbol{N}$

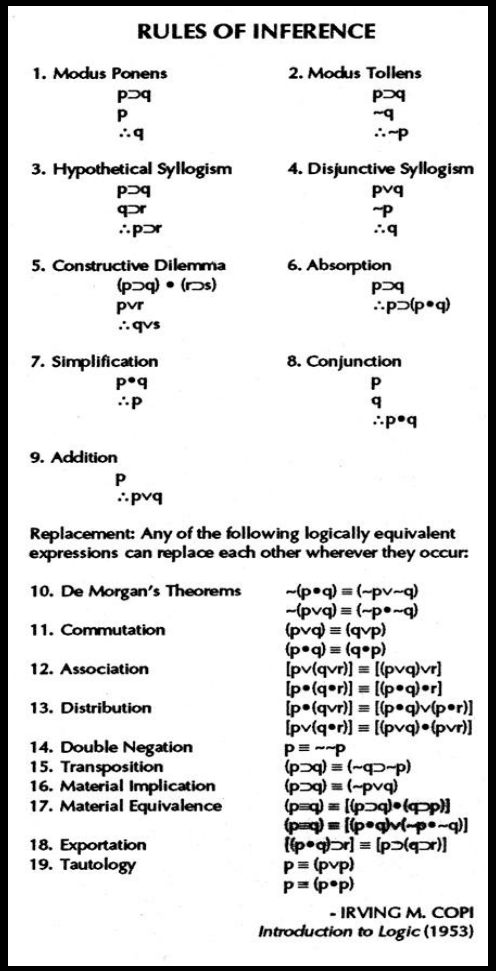
2. Every number n has exactly one successor n'.
$\forall n \exists! x (x = n')$

3. Zero is not the successor of any number.
$\forall n (n \in \boldsymbol{N} \Rightarrow n' \neq 0)$

4. No two numbers have the same successor.
$n' = m' \Rightarrow n = m$

5. The principle of induction:
$S \in \boldsymbol{N} \wedge 0 \in S \wedge (n \in S \Rightarrow n' \in S)) \Rightarrow S = \boldsymbol{N}$

All four Borges fantasy types are developed and explored in contemporary mathematics.



RULES OF INFERENCE

1. Modus Ponens
   $p \supset q$
   p
   $\therefore q$

2. Modus Tollens
   $p \supset q$
   $\sim q$
   $\therefore \sim p$

3. Hypothetical Syllogism
   $p \supset q$
   $q \supset r$
   $\therefore p \supset r$

4. Disjunctive Syllogism
   $p \vee q$
   $\sim p$
   $\therefore q$

5. Constructive Dilemma
   $(p \supset q) \bullet (r \supset s)$
   $p \vee r$
   $\therefore q \vee s$

6. Absorption
   $p \supset q$
   $\therefore p \supset (p \bullet q)$

7. Simplification
   $p \bullet q$
   $\therefore p$

8. Conjunction
   p
   q
   $\therefore p \bullet q$

9. Addition
   p
   $\therefore p \vee q$

Replacement: Any of the following logically equivalent expressions can replace each other wherever they occur:

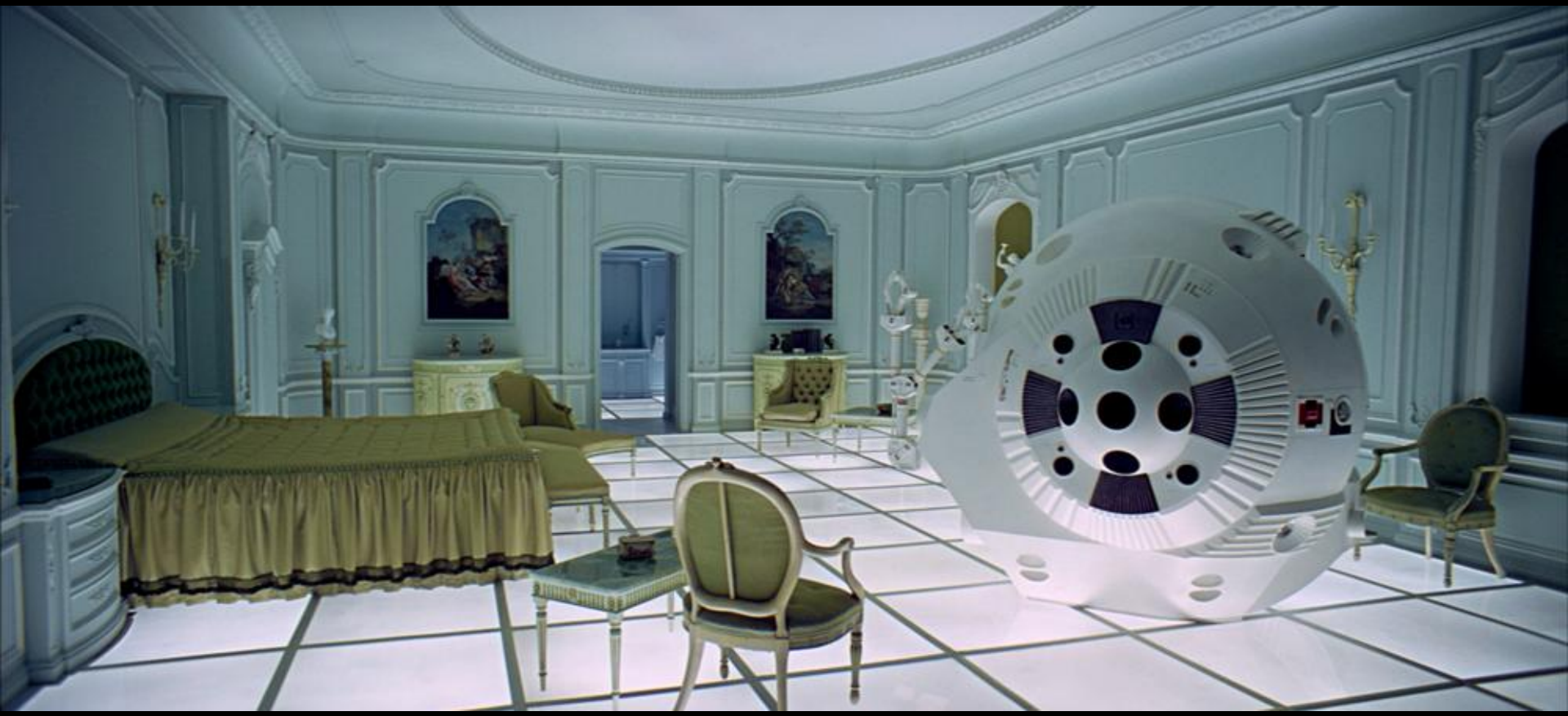
10. De Morgan's Theorems
    $\sim(p \bullet q) \equiv (\sim p \vee \sim q)$
    $\sim(p \vee q) \equiv (\sim p \bullet \sim q)$
11. Commutation
    $(p \vee q) \equiv (q \vee p)$
    $(p \bullet q) \equiv (q \bullet p)$
12. Association
    $[p \vee (q \vee r)] \equiv [(p \vee q) \vee r]$
    $[p \bullet (q \bullet r)] \equiv [(p \bullet q) \bullet r]$
13. Distribution
    $[p \bullet (q \vee r)] \equiv [(p \bullet q) \vee (p \bullet r)]$
    $[p \vee (q \bullet r)] \equiv [(p \vee q) \bullet (p \vee r)]$
14. Double Negation
    $p \equiv \sim\sim p$
15. Transposition
    $(p \supset q) \equiv (\sim q \supset \sim p)$
16. Material Implication
    $(p \supset q) \equiv (\sim p \vee q)$
17. Material Equivalence
    $(p \equiv q) \equiv [(p \supset q) \bullet (q \supset p)]$
    $(p \equiv q) \equiv [(p \bullet q) \vee (\sim p \bullet \sim q)]$
18. Exportation
    $[(p \bullet q) \supset r] \equiv [p \supset (q \supset r)]$
19. Tautology
    $p \equiv (p \vee p)$
    $p \equiv (p \bullet p)$

- IRVING M. COPI
Introduction to Logic (1953)

Rules of Logic

Since mathematics defines reality in our contemporary world, and mathematics is a totally imaginary subject, does this mean that our entire picture of reality is based on fantasy?

Four Fantasies



Answer: YES!

But that's another lecture...

http://www.t-bag.org/KTour/ktour.htm