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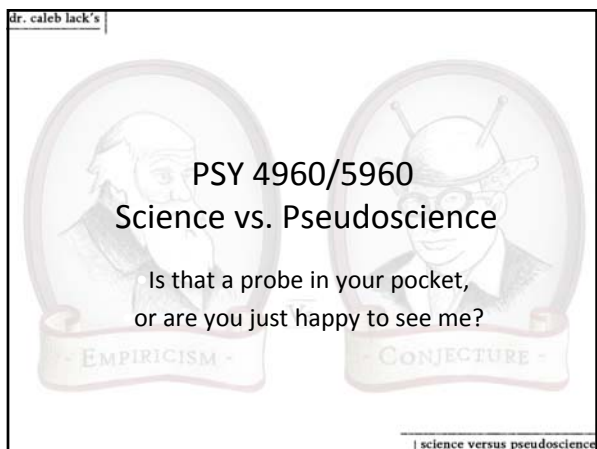
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## Are We Alone?

- There are
  - 250 billion stars in our galaxy
  - 70 sextillion ( $70 \times 10^{22}$ ) stars in the universe
- Statistically speaking, if there was life on planets orbiting only 0.000000001% of them, there would still be  $70 \times 10^{15}$  alien civilizations out there

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## Drake Equation

$$N = R^* f_p n_e f_l f_i f_c L$$

where:

- $N$  is the number of civilizations in our galaxy which we might hope to be able to communicate with
- $R^*$  is the average rate of star formation in our galaxy
- $f_p$  is the fraction of those stars that have planets
- $n_e$  is the average number of planets that can potentially support life per star that has planets
- $f_l$  is the fraction of the above that actually go on to develop life at some point
- $f_i$  is the fraction of the above that actually go on to develop intelligent life
- $f_c$  is the fraction of civilizations that develop a technology that releases detectable signs of their existence into space
- $L$  is the length of time such civilizations release detectable signals into space.

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## Drake Equation

- Most of the parameters are guesses, but even conservative estimates yield  $N$ 's much greater than one (the number known to exist)
- This leads to the Fermi Paradox, or

# “Where is everybody?”

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### Aliens Through the Ages?



Ezekiel's vision of the flying disc



Stories of elves, pixies, and faeries have many similarities with modern-day UFO tales

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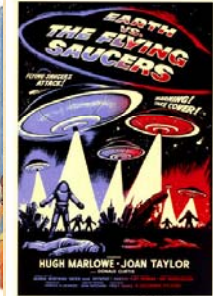
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### Aliens in the 20<sup>th</sup> Century

- Aliens from other worlds first came into the public eye with books such as HG Wells' *War of the Worlds*
- Movies in the 1930s and 1940s were rife with aliens and spacecraft



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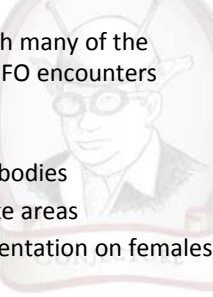
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### Aliens in the 20<sup>th</sup> Century

- These stories help establish many of the "facts" seen in alien and UFO encounters
- Saucer shaped craft
- Big eyes and heads, small bodies
- Capturing people in remote areas
- Abduction of and experimentation on females
- Missing time and trances



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### Modern UFOology

- The term "flying saucers" is a happenstance of miscommunication
  - Report on early supersonic jets that were "unidentified" described them as moving like "a saucer thrown across a lake," but the reported changed the wording around
- The public read the term "Flying Saucers" and began to see just that

Kottmeyer (1990)

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### Alien Abduction

- Started with the case of Betty & Barney Hill, who in September, 1961 along US Route 3 noticed a bright, starlike object heading for their car
- Barney stopped the car for Betty to get a closer look, the saucer-shaped object came closer
- Saw aliens dressed in shiny black leather uniforms



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### Alien Abduction

- The object came closer still; the Hills retreated to car and were pursued for a short time but got home
- Later, the Hills found 2 hours of "missing time"; under hypnosis they "recovered" memories of their abduction
- Each described a "medical exam" by Gray Aliens
- Betty began having nightmares of the incident shortly afterwards



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### Analysis

- First hypnosis session took place about two weeks after airing an episode of *The Outer Limits*, which featured this alien:





Barney Hill's "abductor" from his first hypnosis session

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### Analysis

- Betty had read "The Flying Saucer Conspiracy" shortly before she began having nightmares of abduction
- The psychiatrist who hypnotized the two of them originally did not believe they were abducted
- A movie based on the incident was shown on NBC in 1975, sparking further publicity about the look of "real" aliens

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### Analysis

- Prior to the Hills' case, abductions had been reported, but the type of aliens were varied and included
  - Zebra-striped spacemen
  - Elephant-faced beings
  - Six armed, 13 foot tall aliens
  - Hairy dwarves
- Afterwards, the "Greys" were all the rage



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## Roswell

- In July 1947, something crashed in a ranch outside of Roswell, NM
- US military was involved in the recovery efforts and said it was a "top-secret weather balloon"
- The incident received very little press for over 30 years



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## Roswell

- An UFOologist published an interview with an Army major in 1978 who said it was not a weather balloon, but a downed alien ship
- Subsequently, others came forward with more and more information on the "incident"
- Came to a head in 1995, with a video of an alien autopsy supposedly performed in Roswell after the crash in 1947

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## Exercise #5

### Alien Autopsy

As we watch this footage, supposedly taken in Roswell, New Mexico in 1947, employ all the critical thinking tools you have learned about in this course.

What's your verdict?

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### Alien Autopsy Issues

1. No sample of the film has been given for dating, an easy thing to do
2. Why bury the bodies without further study?
3. Too many people involved for secrecy to have been kept for so long
4. Shoddy recording equipment
5. Humanoid shaped alien is very improbable
6. Conflicting "eye witness" accounts of alien
7. Alien is very prototypical of later-day accounts

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### Alien Autopsy Issues

8. Non-professional autopsy and recording of organs, skin, etc.
9. Easily faked props, including the body

And the biggest issue of all...

10. In 2006, Ray Santilli admitted that the footage was shot in a London flat, but insisted that it was a "recreation" of original footage that he had seen and purchased from an anonymous individual

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### Now, About that Abduction

- A 1992 poll found that
  - 18% of those surveyed reported waking paralyzed at night, aware of strange beings in the room
  - 13% reported episodes of missing time
  - 10% claim to have flown through the air without mechanical assistance

EMPIRICISM vs CONJECTURE

<http://www.scifi.com/ufo/roper/>

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### Now, About that Abduction

Those who commissioned the study drew the following conclusion:

**Approximately 2% of the population, or six million people, has been abducted by aliens**

"It's surprising more of the neighbors haven't noticed."



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### Now, About that Abduction

- The poll never actually *asked* the participants if they had been abducted, just "deduced" it from their answers to other questions

Are we really to believe that millions of Americans have been taken into spaceships and probed by aliens, or are there other possible explanations?

CONJECTURE

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### Any Signals in the Noise?

- With the immense number of UFO sightings and alien abductions, where is the hard evidence of extraterrestrial interference in our lives?
- No alien artifacts, no confirmed abductions, no strong video or photographic evidence, and no alien beings have ever been found

But, what if it's a government cover-up?

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### FOIA and the NSA

A. RADAR TRACKING OF UFO ACTIVITIES: 1444-1446, ONE UFO (BELIEVED BALLOON) WAS TRACKED MOVING NORTHEASTWARDS OVER AREA 48 NAUTICAL MILES 135 DEGREES OFF [REDACTED] AND, FADING AWAY AT 47 NAUTICAL MILES 124 DEGREES OFF [REDACTED] ALT 44,000 FT.

A. BETWEEN 2348Z [REDACTED] AND 0441Z [REDACTED] AN UNIDENTIFIED FLYING OBJECT WAS NOTED ACTIVE OVER THE [REDACTED] AS FOLLOWS: 1. AN UNIDENTIFIED AIRCRAFT APPEARED 120 KILOMETERS [REDACTED] 2348Z AND TRACKING OF THIS AIRCRAFT CEASED 47 KILOMETERS [REDACTED] AT 0013Z. 2. AN UNIDENTIFIED AIRCRAFT APPEARED 111 KILOMETERS EAST OF [REDACTED] AT 0101Z AND TRACKING OF THIS AIRCRAFT CEASED AT 105 KILOMETERS NORTHEAST OF [REDACTED] AT 0102Z. 3. A [REDACTED] AIRCRAFT APPEARED 80 KILOMETERS EAST OF [REDACTED] AT [REDACTED] ALTITUDES OF 8,000-8,400 METERS AND AT SPEEDS OF 110-177 KNOTS. TRACKING OF THIS AIRCRAFT CEASED AT 22 KILOMETERS EAST OF [REDACTED] AT 0441Z. IN ADDITION, AT 0436Z [REDACTED] XG05-2 #2209 NNN

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### FOIA and the NSA

ZEM [REDACTED]

SECTION SEVEN

THIS MESSAGE IS CLASSIFIED SECRET SPOKE IN ITS ENTIRETY. THE FOLLOWING INFORMATION HAS BEEN PROVIDED [REDACTED]

[REDACTED]

(1355-1401), ONE UFO MOVED FROM 75 NAUTICAL MILES EAST OF [REDACTED] TOWARD EAST AND FADED NEAR [REDACTED]

EMPIRICISM VS CONJECTURE

Proof of a cover-up?

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### NSA and John Lennon

Memorandum

TO : SAC, NEW YORK

FROM : SAC, SAN DIEGO

SUBJECT: [REDACTED]

FBI Agents in San Diego for Conspiracy to Obstruct Property and Trespassing for the Government Property during demonstration Vietnam War. An address book contains 315 entries was found in his possession.

396. JOHN & YOKO LENNON  
Old Chelsea Station  
P.O. Box 604  
N.Y., N.Y. 10011

EMPIRICISM VS CONJECTURE

science versus pseudoscience

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### Alternate Hypotheses

- Instead of alien spacecraft, UFOs might be
  - Unknown aircraft or balloons
  - Atmospheric illusions
  - Artificial satellites reentering the atmosphere
  - Misinterpreted planets or stars
  - Clouds and ball lightning

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### Alternate Hypotheses

- Instead of abductions, these experiences might be examples of
  - Hypnogogic hallucinations
  - Hynopompic hallucinations
  - Culturally relevant interpretation of a fantasy
  - Culturally less traumatic interpretation of abuse
  - Known memory problems, such as confabulation or suggestion with the help of hypnosis

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### But Why do People Believe?

Based on what we've learned so far in class, what are some reasons people continue to believe in abductions and alien visitors?

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VS



“I try not to think with my gut. If I’m serious about understanding the world, thinking with anything besides my brain, as tempting as that might be, is likely to get me into trouble.”

Carl Sagan

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