2. The Induction by Confirmation

Exercises

Each of these passages contains an induction by confirmation. For each, read the passage carefully and write out the premises and the conclusion. Order the premises as shown in the chapter. The conclusion will be one of the following: the hypothesis is probably true, the hypothesis is probably false, or the hypothesis is indeterminate.

The answers for 2.1 – 2.5 are at the end.

(2.1) The car that wouldn’t start

Early Saturday morning, Matt left his apartment and got into his car. Unfortunately, the car would not start, and so Matt called his father to get some advice about what to do. Matt’s mother answered the phone and when Matt explained the problem to her, she yelled to her husband “Matt’s car won’t start.”

Matt’s father figured that the battery was the problem because having a battery that is not functioning properly is a very common reason for cars not to start. Plus he knew that the battery in Matt’s car has not been replaced for a very long time. He yelled to his wife, “tell him to turn on the lights. If they don’t go on, then the problem is the battery.” Matt’s mother told this to Matt, and Matt turned the switch for the headlights. They didn’t come on. After more shouting, this information was relayed to Matt’s father who punched the air in satisfaction.

(2.2) The case of the missing pop-tarts

Just before leaving for school, Steve went to the kitchen to get a pop-tart. But when he looked in the cupboard, he found that his last box of pop-tarts had been taken. Steve presumed that one of his three roommates had taken them, and it seemed most likely to him that it was Fred. Steve knew that Fred had been up late last night watching television; he knew that Fred liked to snack while watching late night
television; and he knew that in the past Fred had taken other people's food without asking for permission. Steve figured that if Fred had opened the box of pop-tarts and started eating them while he was watching television, he would have taken what he didn't finish up to his bedroom to save for later. Steve hurried up to Fred's bedroom, entered without knocking, and looked around the room. Although he found Fred snoring away in bed, Steve could not find any pop-tarts. Annoyed, he left for school, bought a pretzel on the way, and was late for his first class.

(2.3) A house in Amityville

The events that occurred at 112 Ocean Avenue in Amityville, New York make it the most famous haunted house in America. In June of 1965, the DeFeo family moved into the house. Nine years later, the oldest child, 23 year old Ronald “Butch” Defeo Jr., killed his parents and all four of his siblings with a .35 caliber rifle while they were sleeping. The gruesome murders received national news coverage, but it was the experiences of the next family that made the house at 112 Ocean Avenue truly infamous. Even though they knew about the murders, in December of 1975, George and Kathy Lutz purchased the house and moved in with their three children. Twenty-eight days later the Lutzes fled, leaving their belongings and ultimately selling the house to the bank for a loss.

According to George Lutz, shortly after they moved in they became concerned by a series of unusual events. On their first day in the house, their dog tried to escape, nearly killing itself in the process. All of the Lutzes heard inexplicable loud noises such as scrapes and creaking. And objects were moved and even removed from the house, including a substantial amount of money that disappeared just as it was about to be used to help pay for a wedding. These events made George and Kathy Lutz suspect that their house might be haunted by the family that had been murdered there only a little over a year earlier.

Once they became certain, they left, never to return.

These strange occurrences convinced George and Kathy Lutz that they had to leave their new home. George Lutz often woke up at 3:15 am feeling uneasy—and 3:15 am was the time when the DeFeos had been killed. Red welts mysteriously appeared on Kathy Lutz’s chest, which the Lutzes believed were from an unseen force stomping on her. A small room with red walls was discovered in the basement, and the Lutz’s
dog would cower and become skittish whenever it went near the room. And finally, the Lutz’s five-year-old daughter began speaking to an imaginary friend: a demonic pig-like creature with glowing red eyes named Jodie.

(2.4) A Pynchon mystery

Last Tuesday, long-suffering fans of the reclusive writer Thomas Pynchon received a double gift. Pynchon’s latest book, *Inherent Vice*, a stoned-out detective story set in early-’70s L.A., was released by Penguin Press. And to promote it, the publisher put out a cool video trailer featuring a narrator whose slow, lazy cadence sounds suspiciously like that of Pynchon’s, as evidenced by a guest appearance on *The Simpsons* and a clip from a German TV advertisement. Inquiries by the blogger GalleyCat and others as to whether Pynchon is the guy channeling the novel’s main character, beach bum private eye Doc Sportello, have been met with “no comment” from Penguin Press and the video’s producers, Meerkat Media. And, of course, the man himself is mum (Would Pynchon fans expect anything else?).

In an effort to solve the mystery, the *Wall Street Journal* did a little sleuthing and called Ed Primeau, a Michigan-based sound engineer and voice identification expert. Like handwriting analysis, voice identification is an inexact science, often used by law enforcement to rule out a suspect rather than to provide a 100 percent clear-cut ID. Still, people have unique vocal timbres and deliveries, especially Pynchon, who sounds like actor John Astin (i.e., Gomez Addams from the old TV show), mixed with a Midwest corn farmer, with a dollop of aging stoner.

So, is it possible to rule out the man in the *Inherent Vice* trailer as being the same guy in *The Simpsons* episode and German TV clip? Not at all, according to Primeau. In fact, he says, based on a preliminary analysis the speech pattern and inflection is “virtually identical” in all three clips. “It’s a very unique style of delivery,” Primeau says. “It’s very up-and-down. He’ll hit these accented spots every few words. You know the TV show “Dragnet,” how Joe Friday talked? It’s the opposite of that.” And so, Primeau’s conclusion: “With a reasonable degree of professional certainty, I believe these voices were delivered by the same person.”
(2.5) New England’s Dark Day

At noon, it was black as night. It was May 19, 1780 and some people in New England thought judgment day was at hand. Accounts of that day, which became known as ‘New England’s Dark Day,’ include mentions of midday meals by candlelight, night birds coming out to sing, flowers folding their petals, and strange behavior from animals. The mystery of this day has been solved by researchers at the University of Missouri who say evidence from tree rings reveals massive wildfires as the likely cause.

“The patterns in tree rings tell a story,” said Erin McMurry, research assistant in the Tree Ring Laboratory at the University of Missouri’s College of Agriculture, Food and Natural Resources. “We think of tree rings as ecological artifacts. We know how to date the rings and create a chronology, so we can tell when there has been a fire, or when a drought occurred, and unlock the history the tree has been holding for years.”

Limited ability for long-distance communication prevented colonists from knowing the cause of the darkness. It was dark in Maine and along the southern coast of New England with the greatest intensity occurring in northeast Massachusetts, southern New Hampshire and southwest Maine. In the midst of the Revolutionary War, Gen. George Washington noted the dark day in his diary while he was in New Jersey.

Nearly 230 years later, University of Missouri researchers used fire scar evidence to determine that the dark day was caused by massive wildfires burning in Canada. “A fire comes along and heat goes through the bark, killing the living tissue. Sometimes, however, the tree itself does not die. A couple of years later, the bark falls off revealing the wood and an injury to the tree, but after a period of recovery the tree continues to grow. When looking at the rings years later, you see charcoal formation and a resin formation that creates a dark spot,” said Richard Guyette, director of the Tree Ring Lab and research associate professor of forestry in the University of Missouri’s School of Natural Resources.

The researchers studied tree rings from the Algonquin Highlands of southern Ontario and many other locations. They found that a major fire had burned in 1780 which would have affected atmospheric conditions hundreds of miles away. Large smoke columns were created and carried into the upper atmosphere.
“This study was a unique opportunity to take historical accounts and combine them with modern technology and the physical historical evidence from the tree rings and solve a mystery with science,” McMurry said.

(2.6) Ether: The backdrop of existence

By the early 1800s physicists knew that light behaved as a wave. And waves, scientists knew. From a ripple in a pond to a sound moving through the air, all waves seemed to share a few essential features. Like sculptures, waves always seemed to require a medium—some physical substrate that the waves must travel through. Because light is a wave, the thinking went, it must also require a medium, an invisible substance that permeated the universe. Scientists called this hidden medium the ether.

In 1887 Albert Michelson and Edward Morley designed an experiment that would search for this ether. They set up an interferometer—a device with two arms in the shape of an L that was optimized to measure change. A single source of light would split, travel the length of both arms, bounce off mirrors at the ends, then recombine. If the length of time it took the light to travel down either arm changed by even a faction of a microsecond, the recombined light would glow darker than the original source.

Michelson and Morley set up their interferometer and monitored the light for months as the earth moved around the sun. The earth traveling through the stationary ether would create a wind-like effect, which should alter the time it took for the light to bounce down the perpendicular arms. (At some point, the light traveling up and down one length would be traveling into and then with the “wind,”
while the light traveling up and down the other length would always have the “wind” hitting it from the side. The light traveling into and then with the ether wind would be slowed down more than the other.)

Find this difference, and you have found the ether. Of course, the experiment found no such thing, thus beginning the destruction of a cosmology hundreds of years old.

(2.7) Pasteur and spontaneous generation

Even after Francesco Redi’s experiments in the 17th century, many people clung to the theory of spontaneous generation. The discovery of micro-organisms not long after Redi’s book was published seemed to reveal a whole new realm where spontaneous generation could occur. It was not until 1859 that the French chemist Louis Pasteur was able to satisfactorily put the issue to rest.

In 1859, the French Academy of Sciences sponsored a contest for the best experiment either proving or disproving spontaneous generation. In his winning experiment, Pasteur heated the long neck of a flask in a flame until it became pliable, and then bent it into the shape of an S (see figure 3). He then boiled meat broth in the flask. Air could enter the flask, but airborne micro-organisms could not—they would settle at the low point in the neck of the flask. As Pasteur expected, no micro-organisms grew. When Pasteur tilted the flask so that the broth reached the lowest point in the neck, where any airborne particles would have settled, the broth rapidly became cloudy with life. Pasteur had both refuted the theory of spontaneous generation and convincingly demonstrated that micro-organisms are everywhere—even in the air.

Figure 2. Louis Pasteur examining a flask with an S-shaped neck (i.e., a swan-necked flask). Painting by Robert Thom.
(2.8) Was Napoleon poisoned?

Note: There are actually two specific hypotheses here, the intentional poisoning hypothesis and the accidental poisoning hypothesis. But for this argument, they should be treated as a single hypothesis.

For decades, scholars and scientists have argued that Napoleon, who died in 1821 on the remote island of St. Helena in the South Atlantic, was the victim of arsenic, whether by accident or design. The murder theory held that his British captors poisoned him. According to the accident theory, mold transformed the colored wallpaper in his bedroom, which contained an arsenic-based dye, into poisonous fumes.

The evidence behind both theories was that scientists had found arsenic in hairs from Napoleon’s head. Arsenic is highly toxic, and its poisoning symptoms include violent stomach pains. “There is nothing improbable about the hypothesis of arsenic poisoning,” wrote Frank McLynn in *Napoleon: A Biography*. “Science gives it rather more than warranted assertibility.”

But now, a team of scientists at Italy’s National Institute of Nuclear Physics in Milan-Bicocca and Pavia has uncovered strong evidence to the contrary. They conducted a detailed analysis of hairs taken from Napoleon’s head at four times in his life—as a boy in Corsica, during his exile on the island of Elba, the day he died on St. Helena at age 51, and the day afterward—and discovered that the arsenic levels underwent no significant rises. Casting a wide net, the scientists also studied hairs from his son, Napoleon II, and his wife, Empress Josephine. Here, too, they found that the arsenic levels were similar and uniformly high.

The big surprise was that the old levels were roughly 100 times the readings that the scientists obtained for comparison from the hairs of living people. “The concentrations of arsenic in the hair taken from Napoleon after his death were much higher,” the scientists wrote. But the levels were “quite comparable with that found not only in the hair of the emperor in other periods of his life, but also in those of his son and first wife.” The results, they added, “undoubtedly reveal a chronic exposure that we believe can be simply attributed to environmental factors, unfortunately no longer easily identifiable, or habits involving food and therapeutics.”

Gregory Johnson
A team of 10 scientists reported their results in a recent issue of the Italian journal *Il Nuovo Saggiatore (The New Experimenter)*. The hair samples of Napoleon and his family came from the Glauco-Lombardi Museum in Parma, Italy, the Malmaison Museum in Paris and the Napoleonic Museum in Rome. The scientists measured the arsenic levels with great precision by inserting the hairs into a nuclear reactor in Pavia, near Milan. The resulting activation let the team identify trace elements but did not harm the hairs, some more than two centuries old.

Credits (some of the passages have been slightly modified)


(2.1) The car that wouldn’t start

[P1] **Hypothesis.** The battery in Matt’s car is dead.

[P2] **Prediction.** If this hypothesis is correct, then the headlights will not come on when the switch is turned to on.

[P3] **Data.** Matt tried turning on the car’s headlights, but they did not work.

(That the battery in Matt’s car is old is a datum, but it does not go in premise three because it was used to create the hypothesis, not test the prediction.)

[P4] The data match the prediction.

[P5] There are other explanations for the data. The headlights might not have come on because the bulbs are no longer functioning, or there could have been a wiring problem somewhere between the switch for the lights and the lights themselves. The hypothesis is, however, a better explanation for the data than either of these two explanations. Although light bulbs do stop working after a period of time, it is unlikely that the bulbs in both of the car’s headlights would stop working at the same time that the car itself won’t start. And not only are wiring problems relatively rare in most cars, it is, again, unlikely that a wiring problem affecting the headlights would occur at the same time that the car itself will not start.

[C] Therefore, the hypothesis is probably correct.

(2.2) The case of the missing pop-tarts

[P1] **Hypothesis.** Fred took Steve’s pop-tarts and ate some of them when he was watching television late at night.

[P2] **Prediction.** If this hypothesis is correct, then some of the pop-tarts will be found in Fred’s bedroom.

[P3] **Data.** Steve looked around Fred’s bedroom, but he did find any pop-tarts.
(Note that these are also data: (a) Fred was up late last night watching television, (b) Fred likes to snack while watching late night television, and (c) in the past, Fred has taken other people's food without asking for permission. They do not belong in premise three, however, because they are data that were used to construct the hypothesis.)

[P4] The data do not match the prediction.

[C] Therefore, the hypothesis is probably false.

(2.3) A house in Amityville

[P1] **Hypothesis.** The house at 112 Ocean Avenue in Amityville, NY is haunted. The haunting is related to the killing of the DeFeo family, which occurred there in 1974.

[P2] **Prediction.** If this hypothesis is correct, then odd, supernatural events will occur in the house. These events could be, for example, strange coincidences relating to the murders, and maybe strange behavior by the present occupants of the house, especially children or animals.

[P3] **Data.** The passage reports that the following events occurred in the house:

- George Lutz often woke up at 3:15 am, the time of the DeFeo murders.
- Red welts appeared on Kathy Lutz’s chest.
- A small room with red walls was discovered in the basement, and the Lutz’s dog seemed to dislike going near the room.
- The Lutz’s five-year-old daughter developed an imaginary friend named Jodie. Jodie was a demonic pig-like creature with glowing red eyes.

(Note that the incidents that caused the Lutz’s to form their hypothesis— their dog trying to run away, inexplicable loud noises, objects being moved about the house, and probably the murders themselves—are data, but they do not belong in this premise because they are the data that was used to form the hypothesis in the first place.)
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[P4] The data match the prediction.

[P5] There are other reasonable explanations for the data besides the house being haunted. Waking up regularly at 3:15 am could have many causes. The most reasonable explanation is that George Lutz just got in the habit of waking up at this time. That the murders occurred around 3:15 am could just be a coincidence. Kathy Lutz’s welts could also have any number of causes—for example, a rash or an allergic reaction. An unseen force causing them seems the least likely of all the possibilities. That the dog was skittish around a small room in the basement could be because the dog didn’t want to go into a small room. Or the dog might not have liked being in the basement while most of the family was upstairs. The dog’s behavior also could have simply been misinterpreted by the Lutzes. And lastly, a child developing an imaginary friend is not unusual; it is something that many children do. And it may not be unusual for children to imagine creatures rather than human friends since it is all imaginary anyway.

[C] Therefore, the hypothesis is indeterminate.

(2.4) A Pynchon mystery

[P1] Hypothesis. Thomas Pynchon, the author of Inherent Vice, is narrating the video trailer that is being used to promote his book.

[P2] Prediction. If the hypothesis is correct, then the professional voice analysis will find that the vocal qualities (e.g., speech pattern, vocal timber, and inflection) of the narrator in the promotional video for Inherent Vice will be similar to the two known recordings of Pynchon’s voice, one from an episode of The Simpsons and the other from a German TV advertisement.

[P3] Data. A voice analysis of the three audio files by a professional sound engineer and voice identification expert, Ed Primeau, indicated that the “speech pattern and inflection” of the voices on all three clips are “virtually identical.”

[P4] The data match the prediction.

[P5] There are other explanations for why the voices in the three audio clips are the same. As the passage says, voice analysis isn’t that exact, plus different people can have similar voices. Nonetheless, the uniqueness of the voice in each of the clips and
the confidence of the voice analyst, Ed Primeau, suggest that these other explanations are not correct—or at least not better explanations than the hypothesis.

[C] Therefore, the hypothesis is probably correct.

(2.5) New England’s Dark Day

[P1] **Hypothesis.** The unusual darkness in New England was caused by large wildfires in Canada. The smoke given off by these fires reached the upper atmosphere and completely blocked the sun over parts of New England on May 19, 1780.

[P2] **Prediction.** If the hypothesis is correct, when tree rings are examined in forests near New England, there should be dark spots among the rings indicating that indicate fire damage occurred in 1780.

[P3] **Data.** University of Missouri researchers found charcoal and resin formations among the rings of trees in Southern Ontario and other (presumably nearby) locations. These formations are the type expected when a fire has damaged a tree, and their location among the rings indicates that the damage occurred in 1780.

[P4] The data match the prediction.

[P5] There are other explanations for the charcoal and resin that were found in the tree rings. They could have been caused by some smaller fire that damaged the trees, or they could have been caused by a large wildfire that occurred some other time during 1780—after all, the tree rings don’t indicate an exact date. However, since the trees that were affected were found in many different locations, a large wildfire that could have caused the sun to be temporarily blocked seems to be the best explanation for what the researchers found. And if there was such a large wildfire in 1780, it is reasonable to assume that it was the cause of this unusual dark day that happened nearby in that same year.

[C] Therefore, the hypothesis is probably correct.