CHARLATANS IN LAB COATS: HOW SCIENTIFIC COMMUNICATION CAN UNMASK PSEUDOSCIENCE

A Thesis
Presented to the
Faculty of
San Diego State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Liberal Arts and Sciences

by
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Spring 2014
SAN DIEGO STATE UNIVERSITY

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Charlatans in Lab Coats: How Scientific Communication Can Unmask

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4/9/14
Approval Date
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When science has uttered her voice, let babblers hold their piece.

--Jules Verne

Journey to the Center of the Earth
ABSTRACT OF THE THESIS

Charlatans in Lab Coats: How Scientific Communication Can Unmask Pseudoscience
by
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Master of Arts in Liberal Arts and Sciences
San Diego State University, 2014

My thesis presents three popular claims that appear scientific but are in fact instances of pseudoscience. Through traditional sociological concepts of fear culture and moral panic theory, I explore why people are prone to believing pseudoscientific claims despite evidence of their inaccuracies. My thesis also presents a new model for debunking pseudoscientific claims by building off established methods in skepticism and scientific communication. To emphasize the differences between pseudoscience and real science, I explore interactions between pseudoscientific promoters, scientists, the general public, and various forms of media. Finally, I suggest ways that we can further improve scientific communication to prevent its harmful effects on science and society as a whole.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT .......................................................... v</td>
</tr>
<tr>
<td>LIST OF TABLES ................................. ix</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS ............................................. x</td>
</tr>
<tr>
<td>CHAPTER</td>
</tr>
<tr>
<td>1 INTRODUCTION ................................................... 1</td>
</tr>
<tr>
<td>2 SYLLOGISM: A NEW TOOL FOR SKEPTICISM ....................... 6</td>
</tr>
<tr>
<td>Current Tools ...................................................... 6</td>
</tr>
<tr>
<td>The Syllogism Model ............................................ 8</td>
</tr>
<tr>
<td>3 PSEUDOSCIENCE IN ACTION ................................. 11</td>
</tr>
<tr>
<td>Chariots of the Gods ......................................... 11</td>
</tr>
<tr>
<td>The Paleolithic Diet ......................................... 12</td>
</tr>
<tr>
<td>Dianetics and Scientology .................................. 12</td>
</tr>
<tr>
<td>4 DECONSTRUCTING THE CLAIMS .................................. 14</td>
</tr>
<tr>
<td>Ancient Ambiguities .......................................... 14</td>
</tr>
<tr>
<td>Syllogism 1 ...................................................... 15</td>
</tr>
<tr>
<td>Syllogism 2 ...................................................... 18</td>
</tr>
<tr>
<td>Paleolithic Fallacies ........................................ 20</td>
</tr>
<tr>
<td>Syllogism 1 ...................................................... 21</td>
</tr>
<tr>
<td>Syllogism 2 ...................................................... 24</td>
</tr>
<tr>
<td>The Science of Scientology and Dianetics .................. 26</td>
</tr>
<tr>
<td>Syllogism 1 ...................................................... 27</td>
</tr>
<tr>
<td>Syllogism 2 ...................................................... 30</td>
</tr>
<tr>
<td>5 WHY DO WE BELIEVE? ........................................... 33</td>
</tr>
<tr>
<td>Moral Panic Theory ........................................ 33</td>
</tr>
<tr>
<td>Cycle of a Panic ............................................ 35</td>
</tr>
<tr>
<td>Rise: A Culture of Fear .................................... 35</td>
</tr>
<tr>
<td>Fear of the “Other” ......................................... 36</td>
</tr>
</tbody>
</table>
Fear of Poverty and Health .............................................................. 38
Fear of Religion and Science .......................................................... 38
It is Only the Beginning .................................................................... 39
Pseudoscience to the Rescue? ............................................................ 40
Don’t Worry, It’s Just Aliens ............................................................... 40
Eat Your Feelings .............................................................................. 41
Scientology: The Solution to All Your Problems .................................. 42
Diminution? ....................................................................................... 43

6 THE PERILS OF PSEUDOSCIENTIFIC ACCEPTANCE ...................... 44

Learn From the Past ........................................................................... 45
Anticipate The Future ......................................................................... 46

7 POWERS OF PERSUASION ............................................................... 52

Authority and the Public ..................................................................... 52
The Authorities .................................................................................. 53
Interest Groups .................................................................................. 56

8 IS THE MEDIA THE MESSAGE? ....................................................... 58

Printed Media ................................................................................... 59
Visual Media ....................................................................................... 61
Social and Interactive Media ............................................................... 63
Can We Change the Message? ........................................................... 64

9 SOCIETY AND SCIENCE: A DYNAMIC RELATIONSHIP .................. 66

Society on Science ............................................................................. 67
What is Science? ............................................................................... 67
Who is a Scientist? ........................................................................... 68
Science on Society ............................................................................ 70

10 RECOMMENDATIONS ...................................................................... 73

A Pseudoscientific Revolution ............................................................ 73
Power of Written Scientific Communication ....................................... 75
How Do We Do It? ............................................................................ 77
Objectivity and Subjectivity ............................................................... 77
Science Fiction .................................................................................. 80
Media Tactics ...................................................................................... 82
Public Interaction and Education Reform .................................................. 84
The Choice is Ours .................................................................................. 86
REFERENCES ......................................................................................... 87
LIST OF TABLES

Table 1. Enthymeme: Socrates is Mortal Because He is a Man .............................................. 9
Table 2. Enthymeme: The Prevalence of Autism is Linked to Vaccinations ................................. 9
Table 3. Syllogism 1 for Ancient Aliens .................................................................................. 15
Table 4. Syllogism 2 for Ancient Aliens .................................................................................. 15
Table 5. Syllogism 1 for a Paleolithic Diet .............................................................................. 21
Table 6. Syllogism 2 for a Paleolithic Diet .............................................................................. 21
Table 7. Syllogism 1 for Dianetics .......................................................................................... 27
Table 8. Syllogism 2 for Dianetics .......................................................................................... 27
ACKNOWLEDGEMENTS

First, I would like to thank my thesis committee for taking the time to help me with this endeavor. Dr. Linn Bekins, Dr. William Nericcio, and Dr. Todd Braje have all helped me throughout my masters program to grow as a student and writer. Specifically, I want to acknowledge Dr. Braje for introducing me to the topics I now feel so passionately about and for reading draft after draft of my chapters. I would also like to thanks all the professors I have worked with these past two years who each contributed in part to my thesis. Additionally, I want to thank the San Diego State University library as well as the San Diego public library for providing me with the materials required during research. Lastly, but certainly not least, I want to thank my family and Christopher Robinson for encouraging me to pursue this degree and for putting up with me throughout the process.
CHAPTER 1

INTRODUCTION

What if aliens descended upon ancient societies, eager to help our civilization grow? What if the power to cure ourselves of all ills lies within us? What if we can eradicate disease, cure cancer, alleviate mental illness, and extend our lifespan through diet alone? What if…? “What if” can introduce amazing, inspiring questions. But they are just that: questions. To answer these questions, what we really need to ask is: are these suggestions science? Science may seem like a big scary word with big scary consequences, but pseudoscience is the real culprit. When charlatans parade as scientists and when lies and fallacies lead to “proof” and “evidence,” the hope and solutions real science provides is lost. The only way to prevent this is through pseudoscience identification and eradication. My thesis explores whether three current popular followings that claim to be scientific are really instances of pseudoscience in action. These claims include Erich von Däniken’s suggestion that ancient aliens aided in the building of the Egyptian pyramids, Loren Cordain’s Paleolithic Diet, and L. Ron Hubbard’s Dianetic technology and subsequent religion, Scientology. These claims present exciting, uplifting ideas but hinder even more exciting, even more legendary real science.

Debunking pseudoscience and encouraging increased scientific literacy are not new concepts. Specifically, astronomer Carl Sagan, Central Connecticut State University archeology professor Kenneth Feder, and Skeptic Society founder Michael Shermer have provided many tools and advice for discrediting pseudoscientific claims. Current pseudoscientific claims call for even more tools because of their pervasive nature. Unbeknownst to us, pseudoscience can infiltrate everyday life and cause destruction. Because of this all-encompassing power, pseudoscience warrants interdisciplinary study. That is why I have applied topics from sociology, neurology, media studies, history, and professional communication to pseudoscience. Science and pseudoscience are not separated from everyday life and thus should not be separated from other disciplines that equally affect
us. Approaching pseudoscience from a variety of positions allows for deeper understanding of this potentially dangerous phenomenon.

Because of the interdisciplinary nature of my thesis, I recognize that some terms used may hold different meanings for different communities. To clarify my statements and ideas, I will present definitions of key terms as they are used in my thesis.

Skepticism: Professors José R. Maia Neto, Gianni Paganini, and John Christian Laursen of the Universidade Federal de Minas Gerais, the University of Vercelli, and the University of California Riverside, respectively, observe that popular culture likens skepticism to any type of doubt (Neto et al. 2009:1). The authors point out that the seemingly casual term actually carries historical significance and played a role in “philosophical, scientific, political, and religious ideas” (Neto et al. 2009:2-3). Scholars like René Descartes, David Hume, Aristotle, and many more, all addressed skepticism in various ways. For the purposes of this thesis, I use skepticism as a modern, science-centered term. Michael Shermer defines a skeptic as “one who questions the validity of a particular claim by calling for evidence to prove or disprove it” (2002:17). I add that a good skeptic is one who recognizes the extent and limitations of their skepticism. In some cases extreme skepticism can work against science, rather than act as an agent for scientific process. Applying skepticism to a degree where everything is called into question and nothing is determined renders any scientific argument useless. Kenneth Feder (2014:25) notes that this is a not a useful approach because it would mean that we cannot know anything, since there is nothing to know. To properly analyze the claims I present, I will apply Shermer’s skepticism in moderation.

Science: The American Heritage Dictionary’s first definition of science states, “the observation, identification, description, experimental investigation, and theoretical explanation of phenomena” (2013). Feder states, “the techniques used to get at knowledge we can feel confident in—knowledge that is reliable, truthful, and factual—are referred to as science” (2014:23). Shermer adds, “the scientific method…involves gathering data to test natural explanations for natural phenomena” (2002:16). Central to all these definitions is the concept that science is a process or a method. The scientific method can be applied to anything that is falsifiable, or testable. This is not to say that every application will result in
scientific fact, but the method provides a tool with which we can discern a certain degree of truth.

Pseudoscience: Astronomer Carl Sagan (1996:20-21) places pseudoscience opposite science. He observes that unlike science, which thrives on errors and falsifiable hypotheses, pseudoscience presents invulnerable hypotheses that may not have falsifiable elements. Sagan (1996:21) claims the greatest difference between science and pseudoscience lies in their appreciation of human fallibility. In other words, pseudoscience does not acknowledge human weakness or shortcomings, which prevents us from eradicating them. Most importantly, pseudoscience, in addition to being the opposite of science, attempts to impersonate science. For the purposes of this thesis, I find British journalist Damian Thompson’s notion of counterknowledge to be an appropriate definition of pseudoscience. Damian Thompson states counterknowledge is “misinformation packaged to look like fact” (2008:1).

Faith: Lastly, we need to acknowledge the roles religion and faith plays in the science/pseudoscience dichotomy. Faith differs from science in that it does not demand proof. Faith requires unwavering loyalty to concepts that cannot undergo the scientific method due to their unfalsifiable nature. Nevertheless, faith and religion play important roles in society and should not be deemed inferior to science. Their difference, however, is important. Faith is not a substitute for the scientific method; thus, any assertions that claim to be scientific cannot rely on faith.

Using these definitions and building off previously established tools, Chapter 2 presents a new tool for debunking pseudoscience: the syllogism model. This model allows one to break up a pseudoscientific claim into individual premises by identifying the overall claim as an enthymeme, or informally stated argument. With this model, one can more easily apply Sagan, Feder, and Shermer’s tools to pseudoscience.

Chapter 3 presents an overview of the three specific pseudoscience claims I present in my thesis. I explore von Däniken’s world of ancient alien contact, attempt to digest Loren Cordain’s diet based on our Paleolithic ancestors, and try to make sense of L. Ron Hubbard’s eccentric Dianetic technology and its religious following. In Chapter 4, I show how the syllogism model works to debunk these three claims and proves they are not scientific but appear to be so through misrepresented data, marketing tactics, and logistical fallacy.
My thesis also explores why people are prone to believing certain claims even when evidence shows they are pseudoscience. Initial examination suggests blind belief could be the result of insufficient effort in dissecting and researching a specific claim. But further exploration shows the need to believe in such claims stems from a deeper, more complex place in personal and societal life. In Chapter 5, I suggest pseudoscientific acceptance stems from unacknowledged fears that result in what I term latent moral panics. Building off the sociological theories of fear culture and moral panics, I suggest a new type of moral panic exists that is specific to the development of pseudoscientific claims.

Acceptance of these claims could potentially lead to physical, mental, and emotional harm. In Chapter 6, I discuss past harmful moral panic scenarios and draw parallels to the ones we see today. By examining the events that contributed to past moral panics, we can see how harmful current pseudoscientific following can be. Most importantly, pseudoscientific topics like fad diets, fantastical archaeology, and homeopathic treatments do not encourage skepticism, which is an essential tool for understanding our world and effectively meeting the challenges of society.

Despite these harms, we still believe. Chapters 7 and 8 investigate the ways Erich von Däniken, Dr. Loren Cordain, and Scientologists encourage this persistent belief. Promoters abuse current notions of authority, harness power from influential groups, and exploit media to promote their claims. The actual mediums employed by pseudoscience promoters warrant special examination because of the impact a medium can have on a message.

Examining society’s relationship with pseudoscience also means considering the relationship between real science and the general public. Chapter 9 considers why society and science appear to be two exclusive communities with separate interests when, in reality, the way society perceives science and, more importantly, the way science views the public, is skewed. Without a thorough understanding of this dynamic relationship, we cannot hope to improve communication between the two.

In my final chapter, I suggest ways that we, both scientists and the general public, can work toward eradicating pseudoscience for mutual benefit. To achieve this, science needs to be communicated in a new, more encompassing way. Through rhetorical techniques like syllogism, analogy, and storytelling, scientists can relate situations to everyday life. Likewise, properly interjecting science into different media venues increases its positive
visibility. Interdisciplinary approaches to science in schools and universities can also help increase science’s presence. Finally, both the scientific community and the general public need to make concentrated efforts to work together. The power of pseudoscience cannot be underestimated. Our susceptibility to pseudoscientific claims allows harmful ideas to flourish and, without proper application of skepticism, we can be caught in an endless cycle of latent moral panics. Improving scientific communication and science-society relations is key to keeping these panics at bay.
CHAPTER 2

SYLLOGISM: A NEW TOOL FOR SKEPTICISM

While the definitions of science and pseudoscience are easy to articulate, the manifestation of their respective claims are harder to distinguish. So how does one differentiate scientific fact from pseudoscientific claims? Astronomer Carl Sagan, Skeptic Society founder Michael Shermer, and archaeology professor Kenneth Feder, among many others, suggest methods for identifying pseudoscientific claims in archaeology and everyday life. Sagan (1996) provides a “bologna detection kit” to help spot fallacies, Shermer (2002) presents “twenty-five fallacies that lead us to believe weird things,” and Feder (2014) asks us to consider where information comes from. While Sagan, Shermer, and Feder’s tools are extremely useful, they are sometimes difficult to apply to complex, subtle pseudoscientific claims. To make the process of debunking a pseudoscientific claim more manageable, I suggest using a syllogistic model. When pseudoscientific claims are presented they take the form of enthymemes, meaning the statements themselves exclude at least one premise, making their disproval more difficult. Using the following model provides a framework for breaking up pseudoscientific claims into individual premises and conclusions, which makes the skepticism tools set forth by Sagan, Feder, and Shermer more applicable.

CURRENT TOOLS

In addition to providing us with definitions of science and pseudoscience, Sagan, Feder, and Shermer all contribute to the field of skepticism by presenting tools and common fallacies to help us identify pseudoscientific claims. To relay all the tools and fallacies would be tedious and repetitive so I will combine and present the ones most relevant to the claims addressed in my thesis. I have divided the tools into three categories: the first deals with the person or institution making the claim, the second regards the process of forming a hypothesis, and the final category addresses the conclusions made by pseudoscientific promoters based on their processes.
One of Sagan’s tools for detecting bogus claims states, “arguments from authority carry little weight” (1996:210), meaning we cannot trust a claim based only on the credentials of the claimer. Shermer (2002) adds, we cannot assume the antidotes people relay are proof, or that rumors are representative of reality. Feder (2014:23) also encourages us to question the source of information. He suggests posing the following questions: How did the presenter obtain the information? What are their motives for spreading this information? What agenda do they have? What is their source and how expert are they in the topic? These questions are important to consider, but we should remember that the answers do not necessarily provide evidence of a claim’s validity. A claim promoter may benefit from a certain claim and may have obtained information through illegitimate channels, but that does not necessarily make the claim false. Assuming so would be considered an *ad hominem* fallacy (attacking the claimer, not the claim). Shermer also warns against such a quick judgment, “we might either (1) accept a wrong idea just because it was supported by someone we respect (false positive) or (2) reject a right idea just because it was supported by someone we disrespect (false negative)” (2002:57). While it is important to investigate who is making a claim and why, it is more important to analyze their process.

The way a promoter forms a hypothesis and attempts to prove it can determine the scientific nature of the conclusion. To properly execute the scientific method, one must form multiple, equally favored hypotheses that can be falsified. If a claim cannot be falsified, or is considered a “meaningless question” (Sagan 1996:215), there is no point in examining it further; it cannot be a scientific fact. After a reasonable hypothesis, or set of hypotheses, is formed, the investigator must conduct the experiments or gather the data properly. Unfortunately, some people get attached to one hypothesis, which leads to observational selection, suppression of evidence, rationalization of failures, and an overemphasis on the facts that fit the favored hypothesis. As Shermer (2002) warns, those who present claims may overlook (purposefully or not) the fact that a hypothesis can influence an observation, the observer can change the observed, and the selected equipment can construct the results. Instead, the investigator must obtain independent confirmation of the results and consider every conclusion the results could support. If one properly induces hypotheses and correctly gathers data, then they can properly deduce the best conclusion possible.
Shermer relays philosopher David Hume’s maxim, “that no testimony is sufficient to establish a miracle, unless the testimony be of such a kind, that its falsehood would be more miraculous than the fact which it endeavors to establish” (2002:45). Similarly, Sagan suggests applying Occam’s Razor, which “urges us when faced with two hypotheses that explain the data equally well to choose the simpler” (1996:211). Both of these notions help prevent pseudoscientific claims because they encourage the investigator to properly assemble the gathered evidence and reach the most rational conclusion. Unfortunately, this assemblage is ignored in pseudoscience. Often pseudoscientific claims contain properly collected data that later become horribly misinterpreted by logistical fallacy. The fallacies we will encounter most in the following claims are: appeals to ignorance, non sequiturs, post hoc ergo propter hoc conclusions, and confusions of correlation and causation.

Most important to consider is that every link in a chain of argument must work (Sagan 1996:211). If any link in a seemingly scientific claim is formed through misappropriation of evidence or logistical fallacy then the claim is pseudoscientific. This is not to say that the claim is definitely false (that would be an appeal to ignorance), but it does mean that the claim requires further assessment. To establish whether all the links in a potentially pseudoscientific claim work, we can use a syllogistic model.

**THE SYLLOGISM MODEL**

Aristotle said “every one who effects persuasion through proof does in fact use either enthymemes or examples: there is no other way” (Gibson 2008:202). The same applies to pseudoscientific claims. Pseudoscientific promoters use enthymemes to persuade people that their arguments are true and backed by proof. The enthymeme model allows pseudoscience promoters to make bold statements that conveniently conceal assumptions. By identifying the pseudoscientific claims as complex enthymemes, we can break them down into a more formal syllogistic model and debunk them. Dissecting the pseudoscientific enthymeme requires the following steps:

1. Identify the enthymeme (the overall claim)
2. Identify and isolate the premises
3. Determine if the premises are, by themselves, falsifiable
4. Determine the validity of the falsifiable premises and locate any logistical fallacies
5. Determine if the conclusions are reached through logistical fallacy
Table 1 gives an example of a simple enthymeme that is broken down into a syllogism and analyzed using established skepticism tools.

**Table 1. Enthymeme: Socrates is Mortal Because He is a Man**

<table>
<thead>
<tr>
<th>Premise A</th>
<th>All men are mortal</th>
</tr>
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<tr>
<td>Premise B</td>
<td>Socrates is a man</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Socrates is mortal because he is a man</td>
</tr>
</tbody>
</table>

In this classic example, premises A and B are easy enough to verify through common knowledge. The links are simple as well because they represent the transitive property: Socrates = man = mortal. In short, there are no fallacies at play. But let’s look at something more pseudoscientific. Table 2 shows an enthymeme for the anti-vaccination movement.

**Table 2. Enthymeme: The Prevalence of Autism is Linked to Vaccinations**

<table>
<thead>
<tr>
<th>Premise A</th>
<th>Autism diagnosis in young children is steadily increasing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premise B</td>
<td>Children with autism received vaccinations</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Vaccinations cause the increase in autism</td>
</tr>
</tbody>
</table>

In this case, the premises are falsifiable so it is possible they are true. Premise A is true; autism prevalence is increasing (Center for Disease Control n.d). Premise B may also be true; many children in first-world countries are vaccinated, although we need further proof to support that claim that *all* diagnosed children received a specific vaccination. The validity of these premises is troubling because concrete fact is usually all that is needed to prove a point. Looking closer, we see that the conclusion is reached by logistical fallacies. Just because more children are diagnosed with autism does not mean the actual disorder has become more prevalent, possibly just more identified. Furthermore, just because a child is diagnosed with autism after receiving a vaccination does not mean the latter caused the former. Without even proving the opposite (i.e., tirelessly attempting to prove that vaccines definitely do not cause autism), we can still declare this particular statement pseudoscientific.

Debunking pseudoscientific claims need not be an intimidating process. As a pseudoscientific debunker, you do not need to prove an alternative claim, you just need to apply the syllogism model and other previously established tools to reveal the claim’s pseudoscientific nature. Some pseudoscientific claims are more complex to dissect than others and involve developing more than one syllogism. Once a syllogism or set of syllogisms is established, we can apply Sagan, Feder, and Shermer’s tools to successfully
debunk the claim. My thesis focuses on three main pseudoscientific topics rampant today: Erich von Däniken’s ancient astronaut hypothesis, Loren Cordain’s Paleolithic diet, and L. Ron Hubbard’s Dianetic technology employed by the Church of Scientology. In the next two chapters I will introduce the claims and demonstrate, through the syllogistic model and established skepticism tools, why they are all pseudoscience.
CHAPTER 3

PSEUDOSCIENCE IN ACTION

To explore the ways in which the suggested syllogistic model can deconstruct seemingly scientific claims to show their true pseudoscientific nature, I present three case studies. These cases represent pseudoscience in anthropology, archeology, and fundamental religious followings. In each case, the defendants base their claims on seemingly sound scientific knowledge. As we will see, these claims are rooted in questionable inferences and faulty reasoning.

CHARIOTS OF THE GODS

Erich von Däniken’s book *Chariots of the Gods* is a prime example of pseudoscience in the fields of anthropology and archeology. In brief, von Däniken claims “that our forefathers received visits from the universe in the remote past” (1999:viii). He bases these claims on the “fact” that ancient Egyptians were a simple primitive people who could not possibly have built the very complex pyramids that still stand today, along with similar archaeological and historical “evidence.” Luckily for von Däniken, there is “proof” that ancient peoples were contacted by alien astronauts, who must have aided in the building of these complex architectural feats. Among the evidence is a drawing found at Tassili in the Sahara desert of an alien in a space suit. Here von Däniken views the great god Mars and “on his heavy, powerful shoulders rests a helmet which is connected to his torso by a kind of joint” (1999:31). von Däniken’s conclusion? The artists must have been drawing what they saw, and since there does not exist (or existed) any creature reflected in that drawing, it must represent an alien visiting earth. He claims there is no other possible explanation for how or why the Egyptians built the pyramids or accomplished other great achievements: “How can we explain the fact that the Egyptians had a decimal system at the beginning of the first dynasty? How did such a highly developed civilization arise at such an early date? …Who gave them their incredible knowledge of mathematics and a ready-made writing?” (von Däniken 1999:65). The answers must involve ancient intelligent astronauts.
The Paleolithic Diet

The Paleolithic (or Caveman) diet proposes many health benefits on the basis that our early ancestors were the epitome of human health due to their eating habits and we should constrict ourselves to their diets to be equally healthy (Paleo Diet n.d). While a Paleolithic lifestyle has been suggested from at least the 1970’s (Zuk 2013:49), more recently Dr. Loren Cordain has promoted the trend. Currently a Health and Exercise Science professor at Colorado State University, Dr. Cordain offers an alternative to our unhealthy modern lifestyle through the Paleolithic diet. Cordain states that “the Paleo diet, the world's healthiest diet - is based upon eating wholesome, contemporary foods from the food groups that our hunter-gatherer ancestors would have thrived on during the Paleolithic era, or Stone Age” (Paleo Diet n.d). But wait! The diet will also help you “optimize your health, minimize your risk of chronic disease, and lose weight” (Paleo Diet n.d). Dr. Cordain bases the diet’s success on a few trials and seemingly archeologically sound data from ancient ancestors. But while the Paleolithic Diet may provide health benefits to some people, the origins of the diet are archeologically incorrect, making his claims pseudoscientific.

Dianetics and Scientology

The Church of Scientology was born from science fiction writer L. Ron. Hubbard’s book Dianetics: The Modern Science of Mental Health. Scientology labels itself as a religion and is recognized as such in the United States. Its basic morals and teachings mimic that of traditional religions: humans are immortal, humans are generally good, and our capabilities are unlimited. These aspects are not up for debate. As addressed in the Introduction, religion is separate from pseudoscience. But unlike other religions, Scientology presents self-proclaimed “scientific” procedures through which one can achieve a higher state of being. Hubbard describes Dianetics as “the science of the mind” (1950:9) and the Church of Scientology adds, “[it] is a methodology which can help alleviate unwanted sensations and emotions, irrational fears and psychosomatic illnesses” (Official Church of Scientology n.d). Once claims assume a scientific title, they must be analyzed as such. We can therefore continue to dissect the claims made regarding Dianetics without fear of treading too far into the religious category.
The goal of Dianetics is to become a “clear”. A clear is an “individual who, as a result of Dianetic therapy, has neither active nor potential psycho-somatic illness or aberration” (Hubbard 1950:138). Unlike traditional religious practices (e.g., praying, confession, etc.) Scientologists reach this ideal level through a precise, unfailing scientific process called “auditing.” In an auditing session, a “pre-clear” interacts with an E-meter (essentially an electronic devise that records electrical impulses from the skin of the client), which relays the exact state of the reactive mind. Hubbard describes the reactive mind as “the cellular level mind which is not ‘unconscious’ but is always conscious—the hidden mind, hitherto unknown” (1950:329). It “possesses vigor and command power on a cellular level” (Hubbard 1950:11) and thus has power to control our conscious mind without our knowledge. Once this reactive mind is irradiated through auditing, the pre-clear can become a clear. A clear possesses great attributes. He or she is unrepressed; has above average abilities to perceive, recall, imagine, and compute; is mentally stable; can enjoy life; is healthier and free from accidents; and is happier in general (Official Church of Scientology n.d). But only through application of Scientology’s Dianetic technology can these states be achieved.

Erich von Däniken, Dr. Loren Cordain, and Scientologists all make bold claims that attract followers who are looking for answers. We want to know how and why the pyramids were built, we want to know how to lose weight and become healthy, happy, successful people. Readily believing these claims means accepting pseudoscience in lieu of real science. To prove the claims made above are pseudoscientific, I will apply the previously demonstrated syllogism model along with skepticism tools presented by Carl Saga, Kenneth Feder, and Michael Shermer.
CHAPTER 4

DECONSTRUCTING THE CLAIMS

To better demonstrate the power of syllogism in scientific argumentation, I will employ the model presented in Chapter 2 to enhance the argument that claims made by Erich von Däniken, Paleolithic diet supporters, and Scientologists are pseudoscientific in nature. According to the syllogism model, the first step is to identify the enthymeme or overall claim. The enthymemes I have chosen to represent the respective claims are based on the backgrounds presented in Chapter 3 of my thesis. Additionally, I see these enthymemes as simple representations of all the underlying claims made by supporters. It is important to identify these larger enthymemes because these one-sentence descriptions act as take-home messages that are repeated time after time throughout the general public. From there, I have isolated the specific premises that compose the enthymeme, determined whether the independent premises are falsifiable, determined the validity of those statements, and observed how they weave together to make an assertion. Using the previously defined ideas of pseudoscience and science, we can see that these claims display both pseudoscientific “facts” and controversies within science. Some premises are not conclusively testable or falsifiable, some are falsifiable and proven false, and still others are supported but scientists debate the interpretation of facts. Unfortunately, the premises that are not completely false act as fuel for the pseudoscientists to drive home their claims. Additionally, the controversies within science aid this process because pseudoscience promoters point to the dispute as evidence for their own claims. Overall, the claims are based on a mixture of poor induction strategies, logistical fallacies, and unsupported, non-scientific evidence.

ANCIENT AMBIGUITIES

The overall enthymeme presented by Erich von Däniken can be summed in the following statement: “von Däniken proposed that there was indisputable and copious archaeological support for his claim that extraterrestrial aliens had visited Earth in prehistory and had played a significant role in the development of humanity” (Feder 2014:220). This
enthymeme excludes the underlying premises and assumptions that create it, making the claim hard to dispute in its current form. To better assess the validity of von Däniken’s claims, we can use the syllogism model.

Accepting that ancient aliens aided in the building of the Egyptian pyramids requires believing certain underlying “truths.” To analyze these truths, I have organized von Däniken’s most prominent claims and conclusions into a two-part syllogism. Syllogism 1 concludes that primitive Egyptians could not have built the pyramids by themselves. This conclusion is based on Premise A: we do not know how the pyramids were built; and on Premise B: ancient Egyptians were inept. If we can accept these two claims and justify that the conclusion is logical, we can consider the second syllogism. Syllogism 2 represents von Däniken’s overall enthymeme that ancient aliens must have aided in the building of the pyramids because the ancient Egyptians were not intelligent enough to build them on their own. This conclusion is based off of Syllogism 1, which provides Syllogism 2 with a Premise A. Premise B asks us to believe that there exists evidence of ancient alien contact in Egypt. For a visual breakdown of these syllogisms see Table 3 and Table 4.

Table 3. Syllogism 1 for Ancient Aliens

<table>
<thead>
<tr>
<th>Premise A</th>
<th>Pyramids are so complex that we do not know how they were built</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premise B</td>
<td>Ancient Egyptians were inept</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Ancient Egyptians could not have built the pyramids on their own</td>
</tr>
</tbody>
</table>

Table 4. Syllogism 2 for Ancient Aliens

<table>
<thead>
<tr>
<th>Premise A</th>
<th>Ancient Egyptians could not have built the pyramids on their own</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premise B</td>
<td>There is evidence of ancient alien contact in Egypt</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Aliens aided in building pyramids</td>
</tr>
</tbody>
</table>

Now that we have identified the overall enthymeme and isolated the underlying premises, we can determine if the premises are falsifiable and valid, and analysis whether the conclusions are reached by logistical fallacy.

**Syllogism 1**

The first premise (Premise A) that makes up the first syllogism is based off von Däniken’s assumption that we know nothing about how the complex pyramids, specifically the pyramid of Chepos (also know as the Great Pyramid, or the pyramid of Khufu), were
built. He states, “we know next to nothing about the how, why, and when of the building of the pyramid” (von Däniken 1999:80). This premise is clearly falsifiable: we either do know some facts or we do not. While it is true that the Egyptians left no explicit blue prints for the pyramid’s design, it is false that we know nothing. Professional Engineer Dr. Craig Smith explains the Egyptians could have built ramps; used levers or fulcrums; or developed a seesaw-type system (Smith 2004: 47). Smith proposes the most likely scenario includes ramps because ancient papyruses and tomb drawings depict ramps. Others, like physicist and engineer Dr. James Frederick Edwards, suggest a hauling method using the angled face of the structure itself (Edwards 2003:354). Engineers and historians may disagree on the actual means of development, but none suggest that the feat was impossible for this ancient civilization. This is an example of a dispute within science. But von Däniken continues with a very bold claim, “today, in the twentieth century, no architect could build a copy of the pyramid of Cheops, even if the technical resources of every continent were at his disposal” (1999:78). To my knowledge, no architect has collected every technical resource in the world, along with thousands of human laborers, and worked around the clock for over 20 years to attempt to replicate the pyramid of Giza. Some minor attempts at reconstruction have taken place, but nothing on the scale of what the ancient Egyptians endeavored.

von Däniken wrongly assumes that since we have not replicated the pyramids and do not know everything about their construction, we therefore know nothing. This is what Sagan would call an “excluded middle, or false dichotomy” (1996:215) fallacy, meaning that only two extreme positions are considered. von Däniken cannot accept that our understanding of ancient Egyptian civilization is incomplete. Either we should know and understand it completely, or everything we have uncovered so far is false. To von Däniken, the supposed lack of knowledge needed to support current theories validates his hypothesis. To further justify the extreme dichotomy, he argues that his claims’ extreme nature is exactly what makes them true. von Däniken exclaims, “hundreds and hundreds of generations thought that the earth was flat, but those who were initially laughed at for suggesting a spherical earth turned out to be right” (1999:6). Therefore, von Däniken is a courageous person for suggesting the ancient alien hypothesis that will someday be proven. Shermer addresses this common logistical fallacy and states, “heresy does not equal correctness” (2002:50). Plenty of scientists are laughed at and later proven wrong and plenty are treated respectfully and
later proven right. But von Däniken assumes that since his hypotheses are unorthodox, they must be right.

Not only is Premise A falsifiable, it is ill supported and riddled with fallacies. The truth is, scientists and historians know quite a bit about ancient Egyptians and the building of the pyramid of Cheops. The knowledge we lack cannot be used as positive evidence for von Däniken’s claims, nor does the lack of knowledge signify that the answers lay outside of science and our knowable universe.

Although Premise A attacks scientists for their supposed historical ignorance, von Däniken’s claims ultimately demean the ancient Egyptians the most. He assumes that if current scientists cannot figure out how the pyramid of Cheops was constructed, then the answer must come from somewhere beyond our earth. Hence Premise B: ancient Egyptians were inept. To von Däniken, there is no feasible way that modern-day westerners could not figure out something the Egyptians accomplished on their own. Feder calls this the “our ancestors, the dummies” hypothesis: “von Däniken simply cannot understand how, and therefore doesn’t believe that, prehistoric people could have managed all this without some sort of outside help” (2014:231). This notion automatically assumes superiority of modern western society over ancient Egyptian society and is not falsifiable. Current definitions of intelligence differ greatly from what would have been considered intelligent almost 5,000 years ago. Furthermore, current notions of intelligence vary from society to society. For example, a computer programmer with no hunting skills might be considered smart in present day America. But in a hunter-gatherer society, a poor hunter with computer programming abilities would be useless. We simply cannot compare ancient Egyptian ability with current western notions of intelligence.

von Däniken attempts to make his claim appear falsifiable and valid by exaggerating other abilities the ancient Egyptians possessed. He builds up their civilization to look so perfect that it would be impossible to think anything other than outside intelligent being were responsible. This tactic is known as a “straw man” argument, an argument in which a position is caricaturized in a way that makes it easier to attack (Sagan 1996:215). Interestingly, von Däniken blames this exaggeration on Egyptologists. He claims that Egyptologists present Egypt as a ready-made civilization with “genuine miracles in a county that is suddenly capable of such achievements without a recognizable prehistory” (von
Däniken 1999:74). This is untrue. While Egyptians did not have outside help building the pyramids, neither did they build them perfectly on their first try. Egyptologists know, and show, the progression of Egyptian civilization, including the development of the pyramid. Originally, pyramids started as single-level block structures called *mastabas* (Feder 2014). Then, the single-level mastabas gave way to stepped mastabas, which eventually gave way to the great pyramids we see today. Evidence of incomplete and poorly constructed step pyramids can be seen across the Egyptian deserts. But von Däniken does not attempt to explain these trial pyramids; doing so would either mean validating the intelligence of an ancient race or admitting to the incompetence of his ancient aliens, both of which would destroy his hypothesis.

To accept Syllogism 1, we have to believe that scientists and historians know nothing about ancient Egypt. Then, we need to concur that modern western civilization is superior to that of ancient Egypt. Finally, we can come to the conclusion that since we cannot do it, neither could they. As shown, Premise A and Premise B are both false. Since the conclusion rests on the premises validity, it too is false. Even if one does accept Syllogism 1, despite its fallacies, he or she needs to consider Syllogism 2.

**Syllogism 2**

The second syllogism represents von Däniken’s overall hypothesis: intelligent alien beings aided in building the pyramids. He bases the first premise of this syllogism off the conclusion to the first syllogism: primitive Egyptians could not have built complex pyramids on their own. To this he adds a second premise: there exists evidence of alien contact. von Däniken claims, “the gods of the dim past have left countless traces which we can read and decipher today for the first time” (1999:viii). One “trace” is the previously mentioned painting of a “space traveler” at Tassili in the Sahara desert. To von Däniken, this drawing clearly depicts an ancient astronaut because the painters were recounting what they saw, but Feder suggests another reason why von Däniken might be so sure. Feder’s (2014) “inkblot hypothesis,” based off of the classic Rorschach tests used in psychology, tells us that we tend to see what we want to see or what is familiar to us. von Däniken, then, is most likely seeing what he wants to see. In *Chariots of the Gods*, von Däniken is even kind enough to place a picture of an American astronaut next to the picture of the cave drawing so the reader can
make the connection. Is it possible that this ancient civilization was accurately depicting alien life? Possibly. Application of Occam’s razor suggests otherwise. It is overwhelmingly more probable that von Däniken’s preconceived ideas of alien visitation and modern space suits skewed his interpretation of the drawings. The drawings could represent priests, healers, or religious figures. They could also represent nothing and simply be a figment of one’s imagination, like a cartoon. All of these possibilities are incredibly more likely than von Däniken’s hypothesis. Luckily for von Däniken, he has other “proof.”

von Däniken’s main evidence for alien contact is the pyramid itself. He wonders whether it is coincidence that “the height of the pyramid of Chepos multiplied by a thousand million—98,000,000 miles—corresponds approximately to the distance between the earth and the sun” (von Däniken 1999:76-77). To von Däniken, this cannot be coincidence, and therefore “the building site was chosen by beings who knew all about the spherical shape of the earth and the distribution of continents and seas” (1999:77). After performing the calculations myself, I would argue that yes, it is entirely a coincidence. The pyramid of Chepos was 147.5 meters or 483.9 feet high at its completion (Edwards 2003:340). Currently, the structure stands at about 138.8 meters or 455 feet. While not explicitly stated, I assume von Däniken refers to the pyramid’s original height. When converted to miles, we get .091647727 miles (or 0.1475 km). Multiplied by a thousand million (a billion), we get 91,647,727 miles or 147,500,000 km. Right away we see that this calculation is not consistent with von Däniken’s 98,000,000 mile estimate. But let’s continue. The distance from the earth to sun is approximately 92,960,000 miles or 149,600,000 kilometers. Admittedly, the numbers appear similar to our calculations, but the discrepancy still amounts to 1,861,500 miles or 2,991,000 kilometers. If we use von Däniken’s initial calculation, that discrepancy rises to 5,040,000 miles or 8,115,712 kilometers. For perspective, that distance is roughly equal to 11 round-trip voyages to the moon and back. Armed with this knowledge, we can pose the question: why would von Däniken’s highly advanced beings (who had extensive experience in space) be so inaccurate with their earth-to-sun calculations? Also, why choose to multiply the distance by a billion? If you take the height as it is, it equals the average depth of Lake Superior, and for that relation we do not need any multiplication. Even though this relationship is more accurate than the height-to-distance ratio made by von Däniken, no one is suggesting that ancient lake people built the pyramids. The point is,
connections are easy to make if you seek them out. Of course, this is all assuming intelligent life exists beyond our world. Could aliens exist? Possibly. Is there evidence they visited ancient Egyptians and aided in the building of the Great Pyramid? No.

von Däniken’s hypothesis that ancient astronauts aided in the building of the pyramids is largely just an illogical conclusion based on his underlying premises. Once he concludes that the ancient Egyptians were incapable of building such a structure on their own, presence of alien beings provides the only logical scenario. Here he presents a non sequitur: aliens must exist because the pyramids exist. We have seen that there is no evidence to suggest that the Egyptians were incapable of building the pyramids on their own. Just like modern scientists and historians can conceive of legitimate ways to build the Great Pyramid, so could the ancient Egyptians. Without the first enthymeme, von Däniken’s hypothesis becomes even weaker. His only remaining arguments stem from arbitrary calculations and from his interpretation of drawings on a wall that have been taken out of context. Sometimes I find myself wanting to believe these claims are true. Wouldn’t it be cool if out-of-this-world intelligent beings actually came down and, for whatever reason, decided to build giant pyramids in Egypt? Then I remember, isn’t it equally as cool, cooler actually, that intelligent beings did build the pyramids but those beings were human? While the idea of slaves building giant tombs does not have the same glamour as alien contact, it is still just as remarkable that humans have achieved such amazing feats.

**Paleolithic Fallacies**

The overarching enthymeme presented by Paleolithic diet enthusiasts states that our ancient Paleolithic ancestors were healthier than modern humans because of what they ate. My goal is not to prove the successfulness of the diet on an individual level or to criticize people who have benefited from this lifestyle. Instead, I aim to deconstruct the faulty argument that following a Paleolithic diet is best *because* it is rooted in the distant past.

Accepting the Paleolithic lifestyle as a logical and scientific path to an optimal quality of life requires believing the underlying syllogisms. The first syllogism includes two premises: (A) we know what our ancestors ate; and (B) we were healthier in the past. The diet then requires that we make the conclusion that what distant ancestors ate contributed positively to their health. If this syllogism is accepted, we can move on to part two. Premise
A for Syllogism 2 is the conclusion from Syllogism 1: The diet of our ancient ancestors contributed positively to their superior health. Premise B states that modern humans have not adapted to modern food, especially food resulting from the agriculture revolution. Premise A and Premise B from Syllogism 2 contribute to the overall Paleolithic diet claim: Eating like we did in the past is a healthier alternative to modern eating habits because it produced healthier humans in the past and we have not developed sufficiently since then.

Unfortunately, this is a syllogistic fallacy that Paleolithic diet fans do not consider worth dissecting. To really tackle the Paleolithic diet we must first analyze each premise and then consider whether the conclusion is made using logical fallacies. For a visual breakdown of these syllogisms see Table 5 and Table 6.

### Table 5. Syllogism 1 for a Paleolithic Diet

<table>
<thead>
<tr>
<th>Premise A</th>
<th>We know what our ancient ancestors ate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premise B</td>
<td>Paleoolithic ancestors were healthier than modern humans</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Ancient ancestral dietary habits contributed positively to overall health</td>
</tr>
</tbody>
</table>

### Table 6. Syllogism 2 for a Paleolithic Diet

<table>
<thead>
<tr>
<th>Premise A</th>
<th>Ancient ancestral dietary habits contributed positively to overall health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premise B</td>
<td>Modern humans have not undergone sufficient nutritional adaptation to benefit from modern agricultural foods</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Following a Paleolithic diet like our healthier ancestors did will increase our health and decrease the presence of diseases that were not present during Paleolithic times because we have not adapted to modern food</td>
</tr>
</tbody>
</table>

Let us consider the above claims surrounding the Paleo diet and identify what exactly the Paleo enthusiasts propose. As mentioned before, my goal is not to report successful or unsuccessful health changes in individuals. In fact the main Paleo diet website itself admits that “there are no guarantees that every person using this program will lose weight or gain fitness. Weight loss and fitness depend on many factors and the results may vary from person to person” (Paleo Diet n.d). Instead, I aim to discover if the reasoning behind the claimed success is logical.

### Syllogism 1

The first line of acceptance requires believing we know our ancestors’ lifestyles, specifically what they ate. Since our Paleoolithic ancestors did not keep dietary journals,
Tweet about their breakfast, or post pictures on Facebook of their meals, we do not have as detailed a record as we do for modern humans. In fact, during the Paleolithic period archaeological sites are rare and usually not completely intact (Richards 2002). We know relatively little about the diets of Paleolithic peoples, including the amount of calories, protein, carbohydrates, and essential nutrients they consumed. This makes it very difficult, if not impossible, to generalize about diets of people prior to the advent of agriculture. Since the Paleolithic diet does not specify where or when our disease-free ancestors existed, except to say they lived from 2.6 million years ago until the agricultural revolution, it is hard to generate enough conclusive evidence to support that these ancient diets led to better health.

We do, however, have some artifacts, most of which are animal bones and tools. Because most of what we find in archaeological sites points to animal consumption, the Paleolithic diet tells us to “eat generous amounts of animal protein. This includes red meat, poultry, pork, eggs, organs (liver, kidney, heart…), wild caught fish and shellfish” (Paleo Diet n.d). But, as New York University nutritionist Marion Nestle points out, “since bones are better preserved than vegetable matter, they give the impression that hunted animals must have been primary food sources” (Richards 2002). Even though we have some evidence of what our ancestors ate, it is clear that we do not have all the evidence. Paleo enthusiasts see this lack of evidence (i.e., lack of sufficient vegetative remains) as positive evidence that meat was favored. When we apply our skepticism tools, we realize the absence of evidence is not the evidence of absence. In other words, absence of non-meat remains in Paleolithic sites is not evidence that those foods were absent or less favored. Unfortunately, people respond more to positive proof than absence of proof so, with this appeal to ignorance, Paleo diet promoters are free to speculate without fear that others will present unfavorable concrete evidence against them.

Premise B represents the followers’ assertion that our early ancestors were “typically” free from modern illnesses, including: acne, obesity, cardiovascular disease, cancer, autoimmune disease, osteoporosis, myopia, varicose veins, and gout (Paleo Diet n.d).

Besides the blatant “typically,” there is little evidence that our million-year-old ancestors were in fact free from many diseases. In a study by University of Missouri School of Medicine Professor Randall C. Thompson and colleagues, probable or definite atherosclerosis was found in 47 of 137 mummies excavated in four geographically distinct
areas (R. Thompson et al. 2013:1). Although these mummies date back only about 5,000 years, the study presents some significant data. Most importantly, one of the sites was that of Unangan pre-agricultural hunter-gatherers in the Aleutian Islands. In this demographic 60% of the mummies suffered from atherosclerosis, the highest percentage of all the four regions (R. Thompson et al. 2013:1). So why did these hunter-gatherers suffer from a heart disease when they were following the same diet as our ancient hunter-gatherer ancestors? And why did other mummies of Egyptian, Peruvian, and Ancestral Puebloan descent show the same disease? I suspect that Paleo-enthusiasts would argue that 5,000 years is not ancient enough, or that the Unangan hunter-gatherers do not represent our Paleolithic hunter-gather ancestors. But isn’t it more likely that diseases like atherosclerosis are an innate peril of human aging? Randall Thompson et al. (2013) demonstrated that atherosclerosis is not just a current problem, or one localized to a specific region with specific health practices. Using Occam’s razor, it is more logical to conclude that atherosclerosis, and most probably other cardiovascular diseases, are prevalent regardless of location and diet, and more likely dependent on other factors such as age or heredity.

Besides the previous example, there are many other explanations for why one might assume our Paleolithic ancestors were disease-free. For one, most diseases present themselves later in life; much later than the average life span of humans thousands and millions of year ago. Many proponents for a pre-agriculture society use claims like the following to “prove” that post-agricultural societies are worse off: “members of technologically primitive cultures who survive to the age of 60 years or more remain relatively free from these disorders, unlike their ‘civilized’ counter-parts” (Eaton and Konner 1985:283). While this may be statistically true, we need to remember that people in technologically primitive cultures that do have these diseases may not be likely to live past 60, therefore the 60+ sampling group is a collection of people healthy enough to live to that age, likely because they are free from disorders in general. Compare that to “civilized counter-parts” where more 60+ year old people have these diseases because they are, due to modern medicine, able to actually live to 60 or older with the disorder. Additionally, it is possible that our ancient ancestors suffered from many more diseases that we do not recognize today, either because we have now become immune, or because everyone who had it died. So even if our Paleolithic ancestors were “typically free from modern diseases.”
which may not be true, they may still have suffered from pre-modern diseases or simply not lived long enough for modern diseases to manifest. As with other aspects of the Paleolithic diet, the “proof” that our ancestors were healthier solely due to what they ate is merely a case of observational selection at best.

At this point, if we still accept that we can determine ancestral diets, and that humans were healthier in the past, despite evidence to the contrary, we still have to infer one premise is related to the other. In other words, we have to believe that if we follow the first, we can achieve the second. But, does a specific eating habit directly correlate to our overall health? More importantly, did the specific eating habits of our ancestors directly correlate to the diseases they were supposedly free from? As we saw, it is difficult to determine a general diet and standard of health for Paleolithic people. This makes it even more difficult to suggest that ancient dietary habits were directly related to positive health. In dietitian Lois D. McBean and Dr. Elwood W. Speckmann’s article about diet fads, they write, “nutritionists and dieticians are aware that no single food pattern must be adhered to for the purpose of ensuring good nutrition. Man requires specific nutrients, not specific food items” (1974:1072). So even if we could prove what Paleolithic hunter-gatherers ate, and definitively know their positive health status, the conclusion could still result from a confusion of correlation and causation.

**Syllogism 2**

As demonstrated in Table 6, the first premise for the second syllogism is the conclusion from the first syllogism: ancient ancestral dietary habits contributed positively to Paleolithic people’s overall health. Let us consider, despite its fallacies, that the conclusion to Syllogism 1 is logical. From there, we can move on to the second premise and the overall diet’s conclusion.

Premise B represents a large piece of the overall Paleolithic Diet claim: modern humans have not undergone nutritional adaptation since the Paleolithic era, which is why followers can argue that what worked for ancient ancestors will work for us. Likewise, diet promoters like Dr. S. Boyd Eaton and Dr. Melvin Konner claim modern humans have not successfully adapted to what foods are currently widely consumed. Eaton and Konner reflect on the time period between 2 million years ago and 4 million years ago and state,
“evolutionary history made definitive contributions to our current genetic composition, partly in response to dietary influences at the time” (1985:284). They then go on to say, “the range of diets available to preagricultural human beings determines the range that still exists for men and women living in the 20th century” (Eaton and Konner 1985:283). Drs. Eaton and Konner suggest that the period between 4 million years ago and 2 million years ago drastically shaped, or even “programmed”, our optimal diet. But just because certain foods were readily available during that time does not automatically suggest that our bodies were programmed to eat only those foods. Like most animals, our early ancestors followed an optimal foraging model to obtain the most calories with the least amount of energy. Without modern technologies, this meant collecting easy-to-gather materials and hunting easy-to-hunt animals. Thus, food availability during that time period was not necessarily the result of preprogramming, but a manifestation of food source limitations.

Further, the time frame suggested by Eaton, Konner, and other Paleo-enthusiasts seems arbitrary. Why base a diet on a time starting 2 million years ago (except, of course, for the fact that it was the “Paleolithic” era)? Why not start 7 million years ago? And why end with the agricultural revolution? After all, humans have since developed the ability to consume lactose at older ages in life. At the same time, millions of people are allergic to fish, nuts, and peanuts, food we have been consuming for thousands and thousands of years (National Institute of Allergy and Infectious Disease 2012). These facts suggest that we can not only adapt to certain foods in a relatively short time frame, but individual people (and individuals in specific geographical regions) can benefit from the same foods that harm others. Thus, a “preprogrammed” model for human dietary needs is not appropriate.

Biological anthropologist Barbara King sums it up perfectly: “genes no more ‘designed’ our eating behavior than they designed our language or our ways of relating between genders” (2011).

Now we come to the final conclusion: following a Paleolithic diet like our ancestors did will increase our health and decrease presence of certain diseases because the diet mimics what we know our ancestors ate and those eating habits contributed directly to their superior health and freedom from now-common diseases. We considered earlier that some claims could be merely up for scientific debate rather than pseudoscientific. After analyzing the various underpinnings, we can see that some parts of the claim are based on scientific data
and thus falsifiable. For example, we have some evidence of what our ancestors ate and what their health might have been like, even though the significance is debatable. But while real scientific processes behind the diet may be accurately executed they are masked by misinterpretations and faulty correlations. The Paleolithic diet becomes pseudoscience once the claims are broken down using the syllogism model. With successful application of the model we see that to believe the diet’s overall conclusion one must not only accept the interwoven assumptions that this claim carries with it, but must also ignore that all the little “facts” in the chain are held together by logistical fallacy. The presence of scientific data and pseudoscience makes this type of claim especially harmful because the promoters can point to accurate scientific evidence to support their view. But this evidence cannot and does not prove that optimal health is only achieved through mimicking our Paleolithic ancestor’s dietary habits.

**THE SCIENCE OF SCIENTOLOGY AND DIANETICS**

To Scientologists, “Dianetics…provide[s] relief from unwanted sensations and emotions, accidents and psychosomatic illnesses (ailments caused or aggravated by mental stress)” (Official Church of Scientology n.d). Like a lot of religions, Scientology promises happiness and better quality of life for its practitioners. It has a creation story, involves spirits, and contemplates past and future lives. I will not discuss these theological elements of the religion because they are separate from the field of science. I will only deal with the claims that are deemed scientific. Unlike other religions, Scientology claims that its methods are scientific. Specifically, the church claims that L. Ron Hubbard’s notion of the mind and his application of Dianetic technology have scientific merit.

L. Ron Hubbard wrote that Dianetics is “an exact science and its application is on the order of, but simpler than, engineering” (1950:9). Science fiction writer John Campbell regarded the book Dianetics as “a direct, clear statement of a totally new scientific thesis” (Wright 2013:75). The church claims that the auditing practices are objective and successful in ridding one of aberrations. Overall, Scientology’s claims can be narrowed down into two succinct enthymemes: Dianetics is a science; Dianetics works. To successfully prove the pseudoscientific nature of Dianetics, we need to address these two bold claims. The claims are examples of “begging the question” or “assuming the answer” logistical fallacies. This
type of circular reasoning allows Scientologists to claim that Dianetics is a science because it works and Dianetics works because it is a science. But does Dianetics follow the scientific process and does it really work? To dissect these questions, we can use the syllogism model. Syllogism 1 includes Premise A: L. Ron Hubbard’s notion of the mind and the body are scientifically supported; and Premise B: the auditing process is scientific in nature. If we accept these two premises as true, we can conclude (according to Scientologists) that Dianetics as a whole is a science. The second syllogism asks us to believe Premise A: L. Ron Hubbard’s “reactive mind” is the source of all illnesses. Premise B tells us that the Dianetic process of auditing will free us from our reactive minds. Therefore, Dianetics will solve all your problems. While the conclusions may seem logical given the premises, the premises themselves are nonscientific and contain logistical fallacies. For a visual breakdown of these syllogisms, see Table 7 and Table 8.

**Table 7. Syllogism 1 for Dianetics**

<table>
<thead>
<tr>
<th>Premise A</th>
<th>L. Ron Hubbard’s notions of the mind and body are scientific</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premise B</td>
<td>Auditing is a scientific process</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Dianetics is a science</td>
</tr>
</tbody>
</table>

**Table 8. Syllogism 2 for Dianetics**

<table>
<thead>
<tr>
<th>Premise A</th>
<th>The reactive mind is the source of all aberrations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premise B</td>
<td>Auditing works by releasing the reactive mind</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Through proper auditing, all your problems will be solved</td>
</tr>
</tbody>
</table>

**Syllogism 1**

In the introduction to Dianetics, J. A. Winter states, “Dianetics is a science. It has certain laws…these laws have no exceptions -- or at least, no exceptions have been found. In this respect the laws of Dianetics are like the law of gravity” (1950:18). To accept this statement, we need to believe that Dianetics is not only a science, but also a law. We can investigate whether Winter’s statement is true by looking at two aspects of Dianetics. First, we can consider whether the principles that make up Dianetics are scientific. Second, we can investigate the processes Dianetics employs for scientific accuracy. If both the foundations and practices that make up Dianetics are scientifically sound, we can agree with Hubbard and
Winter. If even one premise is unscientific, then we can testify to the pseudoscientific nature of Dianetics.

The basis of Dianetics rests on L. Ron’s Hubbard’s notions of human anatomy. Hubbard hypothesized that humans consist of three parts: the thetan (or spirit), the mind, and the body. We can ignore the spiritual portion since spiritualism is a religious matter. In regards to the mind, Hubbard claims it has two parts: an analytical portion, which is conscious and observes and solves problems, and the reactive mind. “The reactive mind is possessed by everyone. No human being examined anywhere was discovered to be without one or without aberrative content in his engram bank, the reservoir of data which serves the reactive mind” (Hubbard 1950:56). On the surface this statement uses an appeal to ignorance when assuming that just because no one has been discovered without the reactive mind, everyone has one. More importantly, the statement assumes an analytical mind and a reactive mind exist at all.

Hubbard’s idea of an analytical mind and reactive mind are reflections of Sigmund Freud’s conscious mind and unconscious mind, respectively. William Sims Bainbridge, the National Science Foundation’s program director for Human-Centered Computing, notes that Dianetics has been referred to as “the poor man’s psychoanalysis” (2009:43). Additionally, Hubbard wrote Dianetics shortly after World War II when Freud’s methods were on the rise (Pigman 1998). G.W. Pigman (1998:102), literature professor at the California Institute of Technology, notes that since 1960, Freud’s theories have been pushed aside due to a greater focus on biology and pharmacology in psychiatry. While Freud’s contributions to the field of psychology were significant, his theories now lie mainly in the humanities. Harvard law and psychiatry professor Alan Stone (1995) addressed the American Academy of Psychoanalysis with his findings that virtually all Harvard psychoanalysis courses, or those referencing Freud, “are in the humanities, particularly literature; no course is being given in the psychology department, and next to nothing is offered in the medical school”. Similarly, Hubbard’s almost identical claims do not belong in medical textbooks.

As for the body, Scientologists say it is “the physical composition of the person, existing in space and time” (Wright 2013:99). This statement too cannot be classified as scientific because the difference between the mind and the body is largely a question of semantics. In philosophy, the mind—body paradigm poses a never-ending debate, from
Descartes’s (1998) attempt to differentiate the two in his Meditations in the 1600’s, to modern day cognitive science. L. Ron Hubbard’s distinction between spirit, analytical mind, reactive mind, and body is an interesting topic to discuss and debate in the fields of religion, philosophy, psychology, and cognitive science, but their presence is not conclusive enough to be deemed scientifically proven. We can now move to Premise B.

In Dianetics, the process through which one becomes clear is called auditing, meaning, “to listen” (Hubbard 1950:299). Unlike traditional psychoanalysis, the auditing process also involves computing (Hubbard 1950:299), which appears to legitimize the practice because the auditor computes results from an electronic device called an E-Meter. The E-Meter, or electropsychometer, is “an instrument which measures emotional reaction by tiny electrical impulses generated by thought” (Hubbard 1982:6). The device is used during the auditing sessions wherein a pre-clear grips the metal handles of the E-Meter while an auditor asks questions and computes the “precisely accurate” reading the E-Meter displays. Scientologist claim the readings tell the auditor what is going on in the pre-clear’s mind. It is possible that the E-Meter may be able to detect changes in heart rate like a polygraph, but Hubbard’s claims would place the E-Meter above highly sophisticated techniques like functional magnetic resonance imaging (fMRI). Because of Hubbard’s outrageous claims, in 1963 the US Marshals seized over one hundred E-Meters after the FDA charged that the instruments were labeled as effective diagnosis and treatment devices (Wright 2013:111). Since the raid, the E-Meter has been labeled as a religious artifact and carries a disclaimer stating that the device by itself is not useful in treating or curing disease. Even though the E-Meter label now states it cannot diagnose or treat diseases on its own, Scientologists maintain that auditing is a scientific process that uses the E-Meter as a tool. Additionally, the literature surrounding the device gives it a scientific air. Hubbard’s 1982 book *Understanding the E-Meter*, is full of scientific key words like electrical current, conductor, insulator, resistor, and potentiometer, and includes diagrams reminiscent of old electrical engineering textbooks. Despite the unscientific nature of the device and the FDA raids, Hubbard still claims, “E-Metering is a science and an art” (1982:60).

Clearly, Dianetics is a not “a step-by-step scientific process that will help you overcome your limitations and realize your full potential for greatness” (Wright 2013:17). The underlying principles on which it rests are derivatives of psychoanalysis techniques.
developed by Sigmund Freud, and the mind—body phenomenon is not falsifiable and should be reserved for philosophical debate. Furthermore, the technology Dianetics employs does not qualify as scientific because the E-Meter does not demonstrate any scientific properties besides being electronic. But we still need to disprove Dianetic’s success as a means of personal betterment.

**Syllogism 2**

The second syllogism states, “auditing works by freeing people from those factors that cause them to introvert, or be upset or fixated, bringing about a spiritual release and resurgence” (Official Church of Scientology n.d.). The statement asks us to assume two premises: factors causing disease and illness are tangible and can be located; and those aberrations can be irradiated. Scientology asserts that the reactive mind is where these aberrations lie and auditing is how they can be irradiated.

Not only does Dianetics claim that the clear can rid him or her self of illness, it claims that the root of all illnesses is personal as well. The reactive mind “can give a man arthritis, bursitis, asthma, allergies, sinusitis, coronary trouble, high blood pressure, and so on down the whole catalogue of psycho-somatic ills, adding a few more which were never specifically classified as psycho-somatic, such as the common cold” (Hubbard 1950:56). Syllogism 1 proved that the reactive mind is not a scientific concept. Therefore, it is unscientific to suggest that all medical ailments stem from it. But Hubbard is suggesting more than just the existence of the reactive mind; he is asking us to believe that all illnesses are psychosomatic. Psychosomatic illnesses do exist; the most current edition of the Diagnostic and Statistical Manual of Mental Disorders includes a section for “Psychological Factors Affecting Other Medical Conditions and Factitious Disorder” (American Psychiatric Association n.d). This section is only one of many; it is scientifically inaccurate to claim that all illnesses fit this category. For example, you cannot psychologically contaminate yourself with the Escherichia coli bacteria or will yourself to develop epilepsy. Of course, Scientologists could (and do) use multiple logistical fallacies to combat those examples. They use an appeal to ignorance and say that we cannot prove the contraction of the common cold has nothing to do with the reactive mind. But just because science cannot definitively disprove that (it is
essentially not falsifiable), does not mean the theory of the reactive mind is true. Similarly, auditing’s success does not prove its scientific accuracy.

The church claims auditing “can effectively ‘erase’ the contents of the reactive mind and eliminate the ability of such recordings to affect the person without his conscious knowledge” (Official Church of Scientology n.d). Even if we pretend for a moment that Premise A is true, there is no proof that auditing relieves practitioners from their ailments. Hubbard claims that auditing results “are scientific facts. They compare invariably with observed experience” (1950:56). In fact, Hubbard rarely relays specific stories. Instead, his stories, and the ones recounted on the Church of Scientology website, take the form of antidotes: if someone does x, it is because of y, and can be cured by Dianetic technology. The claims Hubbard has explicitly made are outrageous and unsupported. For example, Hubbard once wrote that the E-meter, “rais[ed] a boy from 83 IQ to 212” (Wright 2013:15). To compare, the average person’s IQ is 100, Stephen Hawking’s is around 160, and Albert Einstein’s was recorded between 160 and 190. While some studies show the ability of certain practices (for example, musical lessons) to increase IQ in children, these practices only increase IQ by about five points (Schellenberg 2004). If Hubbard’s claim is accurate, it means the boy’s IQ was raised 129 points! Furthermore, we do not know how old the boy was, when or how the IQ tests were administered, or how far apart they were given.

Hubbard also uses his own experiences as proof that Dianetics works. He claims that Dianetics helped him overcome various medical injuries sustained during World War II. No military records support his claims; in fact there is no mention of Hubbard being wounded at all (Wright 2013:437). The success auditing is attributed is not substantiated, and is even countered by doctors: The American Cancer Association (1966) has stated that they have found no evidence that the E-Meter yields objective benefit in cancer treatment. Any recorded benefits auditing has provided take the form of antidotes, outright lies, exaggerated stories, or observational selection. But Scientology has a safety net. The church claims “individual progress is variable since it is largely influenced by the pre-clear’s dedication and the frequency of sessions” (Official Church of Scientology n.d). In this way, supporters use Sagan’s (1996) “special pleading” fallacy to place the blame on the doubter.

To Scientologists, auditing is 100 percent successful. If a case is not successful, it is because the pre-clear does not understand the process or is not trying hard enough. With this
loophole, Scientologists are free to present only the successful cases, usually in the form of an antidote. This is not science at work. The basis on which Dianetics lays does not qualify as scientific. The analytical mind, the reactive mind, the body, and the spirit are human elements that science cannot distinguish due to their subjective definitions. Additionally, practices used to detect, monitor, and eradicate the reactive mind yield no scientific data and make use of pseudoscientific tools. The claim that Dianetics can rid oneself of illness is ambitious and could be encouraging. Perhaps the techniques can help alleviate psychosomatic illness through the power of positive thought and the placebo effect. But to claim that it does this through science is irresponsible and actively harmful in that it provides false hope and directs people away from proven scientific processes.

Application of the syllogism model can immensely help in proving that claims are pseudoscientific. By identifying overall claims and then dissecting them premise by premise, we can see that deconstructing pseudoscientific claims need not be an intimidating process. This model also allows one to better apply the tools presented by Sagan, Feder, and Shermer. von Däniken bases his claims that the ancient Egyptians were inept by comparing them to modern western society. He believes that if we cannot justify by our standards why or how those ancients built what they did, there must have been some outside source providing them with these ideas. Similar embedded syllogistic fallacies give rise to the enthymeme that we can achieve optimal health by following the diets of our earlier, healthier ancestors. Complete disregard for what constitutes as science misleads Scientology and Dianetic practitioners. So why do we, despite calculated evidence to the contrary, continue to believe in pseudoscientific claims? It could be due, in part, to lack of effort in properly dissecting and researching a specific claim. But the need to believe in such claims stems from a deeper, more complex place in personal and societal life. The next chapter in my thesis explores the reasons why we believe what we do.
CHAPTER 5

WHY DO WE BELIEVE?

The importance of carefully analyzing and deconstructing pseudoscientific claims cannot be understated because readily adopting pseudoscience can be harmful. But before examining how harm results, we must consider why and how pseudoscience is so eagerly digested. Why do so many seemingly smart and educated people fall victim to pseudoscience?

Pseudoscientific claims gain credibility because they present solutions that alleviate our perceived personal and societal fears. Rutgers sociologists Lee Clarke and Caron Chess (2008) note that when these fears are perceived in similar ways by a large group of people, the result is mass moral panic. In relation to the fears and moral panics presented in traditional sociological theories, the fears and moral panics within pseudoscience assume unusual forms. I suggest the fears and panics associated with pseudoscience are dangerously hidden because acknowledging them means admitting that we have no real solutions to assuage them. The subconscious fears, created by what sociologist Barry Glassner (1999) calls “pseudodangers”, that drive invisible moral panics, or as I call them, latent moral panics, are seemingly calmed by solutions that take the form of pseudoscientific claims. All panics call for fast, easy solutions since the panics themselves cause more danger (Clarke and Chess 2008). Ad hoc policies and, in the case of latent panics, pseudoscience readily provide these solutions. When authority figures step in, the solutions are validated, and the media reassures us that we are applying the right solution to our perceived problem. This combination of factors allows pseudoscience to thrive and makes the claims harder to refute.

MORAL PANIC THEORY

Moral panic theory has long been discussed in the field of sociology. Yet the role moral panics play in pseudoscience has yet to be explicitly discussed. This may be because pseudoscientific claims represent a new type of moral panic: a latent moral panic. Through
consideration of traditional panics, the rise, reinforcement, and diminution of latent panics can be fully analyzed.

The term “moral panic” conjures up images of mass hysteria, of citizens running amok screaming about government conspiracies, mind control experiments, and deadly chemicals in our foods. But what is a moral panic exactly? In 1972 sociologist Stanley Cohen first observed, “societies appear to be subject, every now and then, to periods of moral panic. A condition, episode, person or group of persons emerges to become defined as a threat to societal values and interests” (2002:1). After Cohen first offered this definition, many more emerged in sociology. Clarke and Chess summarize theorists like Quarantelli, Smelser, and Johnson and Feinberg, and Goode and Ben-Yehuda respectively:

“flight,” driven by an overwhelming sense of fear, was “the outstanding feature of panic…”; panic is… “a collective flight based on a hysterical belief.”; panic is “unregulated competition” and a “loss of social control”; “the term moral panic…conveys the implication that public concern is in excess of what is appropriate if concern were directly proportional to objective harm”. (2008:996)

Clarke and Chess themselves suggest, “panic is a breakdown in social order, a breaking of social bonds, as a result of some fear, which itself creates more danger” (2008:998). Collectively, a moral panic starts as a communal fear, develops as the fear becomes more displaced from its original source, reaches a climax where irrational actions take place, and subsides once the fear is acknowledged and properly addressed. Most theorists agree that moral panics are phenomena that violently seize a society and eventually release their grip. It is easy enough to comprehend moral panic definitions and imagine some examples, but moral panics stem from very complex and troubling issues; they are external manifestations of internal fears ingrained with deep-seeded moral conflicts and discrimination. It is this complexity that causes some panics to remain latent while still producing the same harmful consequences that accompany traditional panics.

A latent moral panic, like all moral panics, stems from societal fears. But unlike a traditional panic, a latent moral panic is not clearly visible; it is shadowed by pseudoscientific claims that attempt to alleviate a fear. The resulting panic, then, is channeled into mass acceptance. Like the panicked witch hunters who were eager to persecute, we too are eager to subdue a panic by any means necessary. Unfortunately, the manifestation of this new wave of moral panic can be worse than that of a traditional panic because it does not resemble a panic at all. We cannot easily identify pseudoscientific claims as ad hoc solutions
to moral panics, as might be the case with heightened gun control laws or drug use punishments after violent incidents, because the claims are not acknowledged as solutions to anything. Rather, they are viewed as new developments in science. Because of this discrepancy, pseudoscience reflects this new type of moral panic.

Although identifying latent moral panics may be difficult, analyzing traditional moral panics can provide a means by which to examine the latent moral panics that justify pseudoscientific claims like those proposed by Erich von Däniken, the Paleolithic diet, and Scientology.

**Cycle of a Panic**

To adequately analyze a moral panic and, accordingly, latent moral panics, we must consider that the construction and subsequent diminution of moral panics is a complicated process. Cultural and psychological anthropologist Gilbert Herdt states, “Moral panics expose the ideologies, hierarchies, and social fissures of society” (2009:18). By identifying key social components like communal fear present during a latent moral panic, we can better evaluate how and why those panics emerge, why they persist, and how they might be diminished.

**Rise: A Culture of Fear**

The rise of a moral panic begins with fear, anxiety, or concern about a real situation. The concern then turns into a widespread, irrational panic that is “culturally and politically constructed, a product of the human imagination” (Goode and Ben-Yehuda 1994:151). Like a traditional moral panic, latent moral panics stem from fears regarding real situations; and, like latent moral panics, some fears disguise themselves in various shapes and forms, making the real situation harder to identify. The panics occupy societies for a couple generations or persist throughout history and, worst of all, they often go undiagnosed.

While theories surrounding fear culture differ slightly, all focus on the phenomenological aspects of fear displacement, the substitution of fear about a real situation with another “pseudodanger.” Glassner comments, “pseudodangers represent further opportunities to avoid problems we do not want to confront” (1999:8). The witch trials of early modern Europe provide an extreme example. The pseudodanger presented by witches and their curses concealed a real fear of women and their sexuality, among other religious
and societal changes at the time. But unlike the witch trials of long ago, new fears may be further displaced. Sociologist Chas Critcher reflects on Altheide’s culture of fear theory saying, “the older type of fear, which he terms parallel fear, was attached to specific issues or threats and thus tended to be localized, momentary and individual. By contrast, the new type of fear, termed non-parallel fear, is general, pervasive and unfocused” (2011:263). The idea of non-parallel fear lends itself nicely to the idea of latent moral panics because not only are the underlying fears unfocused, they are not acknowledged at all. When unfocused, undetermined fears become hidden, unacknowledged latent panics can arise. Perhaps unexpectedly, the non-parallel fears underlying latent moral panics are really the most dangerous. Sociologist Zygmunt Bauman agrees, “fear is at its most fearsome when it is diffuse, scattered, unclear, unattached, unanchored, free floating, with no clear address or clause” (2006:2).

While Glassner and other fear culture researchers focus on how these benign pseudodangers take the place of real dangers our society is too uncomfortable recognizing, I suggest that pseudoscientific claims offer a means through which confrontation of real fears is avoidable. Pseudoscience provides distractions from un-confrontational real dangers by proposing solutions without acknowledging the fears they attempt to alleviate. We are not only attempting to alleviate our fears by warping them into outrageous ones, but by accepting illogical, seemingly scientific, claims. In both cases, the real underlying anxieties are ignored. Nevertheless, however large these disguised fears pseudoscience reflect might be, they are rooted in reality and thus diagnosable. It is necessary then to analyze the fears that underlie the claims made by von Däniken, Paleodieters, and Scientologists in relation to our current culture to see how they contribute to the rise of the latent moral panics that call for pseudoscientific solutions.

**FEAR OF THE “OTHER”**

On the surface, Erich von Däniken’s claims of ancient alien encounters suggest a fear of being alone. This fear seems easy enough to admit. But, as Glassner (1999) suggests, some evident fears might be substitutes for other, undesirable, even unconscious concerns. In the case of ancient alien encounters, while we may fear being alone, the premise that aliens helped build the pyramids represents guilt about colonization, and the proposition that
ancient Egyptian society was not advanced enough shrouds a more dangerous underlying fear: that of “the other.”

According to Critcher, “a major consequence of the culture of fear is hostility towards those defined as deviants” and “the deviant other is constructed as threatening the innocent in ways which suppress questions of power” (2011:271). In relation to von Däniken’s claims, the ancient Egyptians are “the other.” Although not classified as deviants per se, von Däniken’s ancient alien claims regarding the pyramids place the ancient Egyptians in a category that implies incompetence in relation to current, powerful Western society.

According to Feder, von Däniken “is so astounded, in fact, that he thinks that only through the assistance of men from outer space could native Africans, Asians, and Americans have produced the prehistoric works that archaeologists find on these continents” (2014:241).

von Däniken clearly exemplifies European ethnocentrism. But that does not mean that everyone who believes in his claims is a racist. In fact, the acceptance of the claims could prove just the opposite. Glassner writes, “our fear grows, I suggest, proportionate to our unacknowledged guilt” (1999:72). An unacknowledged guilt in this case involves colonization. Historical records provide ample evidence of western European civilizations routinely voyaging and colonizing “primitive” cultures. The United States even has a holiday, Columbus Day, named after an explorer who slaughtered natives and deemed North America the New World. Could it be that residual guilt over past events finds its way into modern culture through acceptance of pseudoscientific claims? Is it that the pseudodanger of Earth’s colonization by aliens is a projection of Western guilt over previous, hostile takeover of other natives? Of course, not everyone who accepts von Däniken’s claims identifies as a westerner or a colonizer. But, the knowledge that hostile takeover has occurred on our own planet heightens fear that it may happen on a grander scale.

Like with all fears, context is important. Glassner observes, “the success of scares depends not only on how well it is expressed but also…on how well it expresses deeper cultural anxieties” (1999:208). Chariots of the Gods was first published in 1968 and since then has sold over 7 million copies. While fear of “the other” has deep roots, its manifestation is most clear when we are the most vulnerable. Nuclear weapons, the space race, and the Vietnam War were just a few contributors to the rise in fear among the public when von Däniken’s claims were proposed. War, competition, and talks of armageddon
make us more aware of the possibility that local takeover is eminent. The guilt of doing the same to others is equally as terrifying. As turbulent social and political states persist, it seems to follow that many generations from now, people will wonder how our society could ever have built rocket ships or super computers.

**FEAR OF POVERTY AND HEALTH**

The heart of the Paleolithic diet rests on the illogical fact that our ancestors were healthier than modern humans. Even though this claim is not scientifically supported, the fear of mortality or failing health is very real. So what makes the fear behind the Paleolithic diet so unique if the fear is so easy to uncover? In this case, it is the level of fear that matters. As mentioned previously, fear culture theory discusses the disproportional nature of presumed fears to real fears and the guilt that lies beneath. The unacknowledged guilt hidden in the Paleolithic diet that leads to a disproportionate fear of death could stem from multiple venues. Every day, many people go without food. Poverty is rampant in other countries, while more developed ones gorge themselves on unhealthy, heavily processed, easy-to-make products. Thus, one might feel guilty about their ability to mass consume while others go hungry, and then translate that guilt into a heightened fear of their own mortality.

Similarly, we feel guilty that we are not doing enough to prevent our sicknesses. Why, in the age of modern medicine, is it that people continue to die from cancer or unknown causes? Why do people seem to care more about celebrities than doctors? Why is more money spent on prisons than on retirement homes? Avoiding these questions creates guilt, which increases our fear of mortality, and, ultimately, empowers the Paleolithic diet’s claims.

These examples of guilt related to the “First World/Third World” dichotomy and to modern medicine are only a few that may contribute to the increasing fears surrounding the Paleolithic diet. Like any other pseudoscientific claim, there are possibly many more.

**FEAR OF RELIGION AND SCIENCE**

Scientology and Dianetic technology provide a plethora of fears waiting to be uncovered. Like acceptance of the Paleolithic diets, belief in Diantetic technology reveals our fears of being unhealthy or unhappy, and like von Däniken’s claims, the creation stories in
Scientology suggest the presence of intelligent beings outside our world. Scientology also offers its own, far greater, underlying fear: the war between religion and science.

Throughout history, religion and science have been pitted against one another. Debates over the age of the earth or whether we should accept the theory of evolution versus Creationism put science and religion at odds. In some sense, this dichotomy prompts a person to choose a side. Critcher offers sociologist Frank Furedi’s observation that “the free-floating dynamic of fear is promoted by a culture that communicates hesitancy and anxiety towards uncertainty” (2011:264). This anxiety and uncertainty is especially relevant with regards to religion. Take, for example, controversy surrounding the theory of evolution. Some people fear that teaching evolution will cause their religious beliefs to be called into question. Others fear that fundamental religious beliefs will hinder scientific progress by promoting ideas like the inclusion of Creationism curricula in public schools. Most people feel anxiety towards at least some aspect religion or science, if not fear of both. This fear or anxiety of losing religion for science or abandoning science to maintain faith, underlie the unhappiness and loneliness that Scientology attempts to diminish.

**IT IS ONLY THE BEGINNING**

Applying fear culture theory to pseudoscience provides sturdy ground on which to analyze claims. Critcher again summarizes Furedi’s claim that “culture of fear is a construction of society which has lost its nerve and abandoned any positive notions of human progress and competence” (2011:266). We have lost faith that we are an advanced civilization, that we can prevent illness, and that we have the power to make ourselves happy. Ultimately, we fear that we cannot change what we perceive are societal problems.

But acknowledgment of underlying fears that give rise to a latent moral panic still does not explain how those fears actually evolve into the panic. American sociologist Erich Goode and Hebrew University of Jerusalem professor Nacham Ben-Yehuda address this gap: “although large numbers of people may spontaneously feel fear or dread about a given agent or threat, to become a moral panic, this fear must be sharpened, broadened, articulated, and publicly expressed by organized, movement-like activity launched by middle-level interest groups” (1994:167). While this may be true of traditional moral panics, latent moral panics differ in that the articulation and public expression of fear is absent. The fears are not
explicitly expressed but instead articulated through pseudoscientific solutions that hide the fact that latent moral panics are its primary driving force. Unfortunately, the absence of the traditional public articulation of a fear comes at great cost. In traditional panics, a public outlet acknowledges the fears and provides a small window for opportunity of diminution. It provokes some to recognize the ridiculousness of the purported fears and allows for investigation of the real culprit or real fear. The nature of latent moral panics does not allow for this analysis. In chapters 7 and 8, we will see how the aforementioned fears become latent moral panics once their proposed solutions are publicly articulated through pseudoscientific claims made by authority figures and the media. Unfortunately, this publicity only reinforces the fears it attempts to alleviate.

**Pseudoscience to the Rescue?**

The spark that sharpens and broadens a fear into a latent moral panic depends on cultural situations of the time period in which the panic evolves. A time when science and technologies may be replacing traditional religion prompts science-like religions to gain popularity. Similarly, poverty and unstable health systems encourage people to take their health into their own hands through faulty diets. In times of war, the fear of the other is so strong that we seek solace in ideals that reassure us that we are better and will prevail. All these fears present the opportunity for solutions. Science does not always provide us with all the answers that assuage our fears and pseudoscience is eager to fill that gap.

Pseudoscientific claims spawn as a direct result of unacknowledged fears and guilt because the claims provide solutions that often are easier to digest than scientific ones. Claims surrounding ancient aliens, the Paleolithic diet, and Scientology contribute to the latent moral panics that eventually ensue because they sharpen and broaden the underlying fears by secretly articulating them through proposed solutions. But, how do they acknowledge their respective fears?

**DON’T WORRY, IT’S JUST ALIENS**

The fear of being alone in the universe and being taken over by hostile explorers, along with deep-seeded fears regarding “the other” and our own lack of social progress, help construct von Däniken’s claims. He exploits fear of social incompetency compared to “primitive” societies and the exploitation leads to claims that are literally out of this world.
von Däniken silently acknowledges the belief that it is impossible for current society to be so inept as to not know how ancient cultures completed such marvelous feats of engineering, invention, and imagination. How could “they” have build something so much better than what is produced by “us”? Simple, they didn’t; it was aliens that did. von Däniken reinforces our arrogant view that “we” are more advanced than “them,” and conveniently sidesteps the threat that our current society is perhaps less competent than those of the past. Glassner suggests, “we project our guilt onto a cavalcade of bogeypeople” (1999:xxvii), and von Däniken is right there ready to present an entire culture of them. Fear about the “other” is assuaged by the argument that the only compelling accomplishments were those where outside intelligence was involved, confirming our notion that the “other” is less powerful and less threatening.

Similarly, fear of colonization stemming from guilt is lessened when we hear a story about nice, intelligent aliens out to help us. Like the “other” primitive civilizations, alien life does not threaten current Western culture. von Däniken subtly acknowledges our guilt over hostile Western colonization in the past by reassuring us that any life out there will approach us peacefully and with useful technology, like they did with the ancient Egyptians.

All of these fears are heightened when we feel vulnerable to weapons and less confident in our ability to outperform others. In this way, von Däniken’s claims are easy pills to swallow and assuage anxiety through subtle rejection of another society’s ability to achieve great feats. Like Feder’s (2014:221) Inkblot Hypothesis, we only see what we want to see and only accept claims that assuage our already planted fears and guilt.

**Eat Your Feelings**

Suggesting a more hunter-gatherer lifestyle could assuage guilt surrounding poverty because Paleolithic diet followers might feel they do not partake in “First World,” gluttonous culture. Instead, followers practice a lifestyle that all humans were meant to adopt before agriculture, the industrial revolution, and the many other historical events that created a great discrepancy between rich and poor countries. Of course, acceptance of a Paleolithic diet may not be exclusive to people with easy access to food. People in poverty might accept a Paleolithic diet, but those with the ability to choose certain foods, those who have more guilt, have more power to propagate the hypotheses in the first place. Paradoxically, these
advantaged followers throw their money at Paleolithic diet promoters by paying for recipe books, dieticians, magazines, and everything else the diet sells. Instead of spending money to help those who are destitute or those who are sick, we displace the action for fear of acknowledging the survivor-type guilt that results in a greater fear of our own death and ailment.

We do not want to take personal responsibility for our own health or the health of others so we attempt to assuage the resulting guilt and fear by accepting pseudoscientifically-backed health practices. We replace our medical apathy with a diet based on seemingly scientific evidence. The archeological “scientific” backing behind the diet is necessary to offset our medical-related guilt and to validate the evidence put forth.

**SCIENTOLOGY: THE SOLUTION TO ALL YOUR PROBLEMS**

Like the Paleolithic diet, Scientology and Dianetic technologies assuage fear of mortality by replacing scary scientific processes with fundamental religious ideologies. Like ancient alien claims, assertions about alien ancestors make us feel we are not alone. But unlike the previous claims, Scientology attempts to resolve the internal and external conflict between religion and science.

Science constantly challenges religion and religion constantly questions scientific ethics, which makes commitment to both difficult. If adopting solely religion or solely science does not fulfill one’s needs, they are forced to look elsewhere, to a new, third option. Scientology fills that gap. Scientology blends the best of both religion and science. It offers modern technologies (however pseudoscientific they may be in actuality) to appease the scientist, but also offers an escape from the limitations often found in science and the constraints of the scientific method. Likewise, Scientology distances itself from religious criticism while still providing a degree of spirituality. In its own words, Scientology, “bridges Eastern philosophy with Western thought. In that way, Scientology constitutes Man’s first real application of scientific methodology to spiritual questions” (Official Church of Scientology n.d.). Scientology, therefore, neatly offers a solution to the religion/science problem while simultaneously reaping massive monetary profits. Scientologists further promote solutions by declaring a general claim that can apply to any individual, “Scientology, then, contains solutions to the problems of living” (Official Church of
Scientology n.d). With the application of Scientology practices, one not only diminishes their fears of loneliness, mortality, and religious and scientific institutions, but also conveniently solves all problems in their life.

**Diminution?**

Creation and articulation of pseudoscientific claims ensure latent moral panics lead a long life. Goode and Ben-Yehuda observe that while moral panics have been heavily studied, “their demise has been virtually neglected” (1994:168). Likewise, the demise of latent moral panics warrants further investigation as we have yet to see a diminution of the latent moral panics that lead to pseudoscientific followings. This is because pseudoscience encourages latent moral panics by not allowing acknowledgement of underlying fears. We do not want to discuss racism, food shortage, declining health and medicinal limitations, or war between science and religion, so instead we carry on about the significance of alien encounters, the importance of dietary choices, and the benefits of alternative medicine. If we simply accept that aliens were involved in “primitive” actions, we can be reassured that our western society has advanced; if we just follow this diet, we will be healthier; if we just apply Dianetics, we will be happy. These beliefs are manifestations of defense mechanisms meant to protect us from acknowledging real problems, our real guilt and fears. Unfortunately, the underlying problems often go unsolved because we do not want to admit that our proposed solutions are inadequate. Subsequently, these pseudoscientific followings create real danger and cause real harm. The next chapter will explore the harmful effects that pseudoscientific acceptance creates. Once we acknowledge these harmful effects, we can work toward latent moral panic diminution.
CHAPTER 6

THE PERILS OF PSEUDOSCIENTIFIC ACCEPTANCE

Why is presenting solutions to assuage moral panics and underlying fears such a bad thing? Why not let people believe what they want to believe? As appealing as this might sound, it is equally dangerous. Should people be able to believe what they want and not be chastised? Absolutely, that is part of what makes this country so great. Problems arise when solutions are presented that do not fit the fears. Sociologist Barry Glassner observes, “one of the paradoxes of a culture of fear is that serious problems remain widely ignored even though they give rise to precisely the dangers that the populace most abhors” (1999:xvii). Critcher adds, “the major effect of fear is that we are led to misrecognize real problems in order to support simplistic solutions which often worsen the problem they are supposed to tackle” (2011:262). Since panics often have misdiagnosed causes, the proposed solutions are inadequate and often harmful. Most importantly, pseudoscientific topics like fad diets, fantastical archaeology, and homeopathic treatments do not encourage skepticism, which is an essential tool for understanding our world and effectively meeting the challenges of society. Without skepticism and proper scientific methodology, we will be trapped in an endless cycle of panic.

Accepting pseudoscientific claims as science leads to both active and passive harm. Active harm is the tangible harm that results from following a claim (e.g., being beaten or killed as a result of the pseudoscientific belief). Passive harm is what results from not actively attempting to disprove the claim or from not attempting to find a scientific alternative (e.g., allowing Eurocentric ideals to thrive in the form of pseudohistory). All three pseudoscientific claims presented in my thesis spur active and passive harm that, like the pseudoscientific nature of the claims themselves, may be hard to pinpoint. By analyzing past moral panics, we can identify and, hopefully, prevent harm caused by these more latent moral panics.
LEARN FROM THE PAST

The harmful repercussions resulting from the acceptance of pseudoscience as science can be compared to destruction caused by other, more obvious moral panics. One of the most notable and extreme moral panics took place in Europe in the late 16th and early 17th centuries. During this time period, countless numbers of so-called witches were unfairly tried, tortured, and executed for crimes they did not commit. Between 75-90% of executed witches were women, and most were over 50 years old and either unmarried or widowed (Levack 1995:133-156). To revisit Critcher’s claim, “a major consequence of the culture of fear is hostility towards those defined as deviants” (2011:271). In the case of the witch trials, these deviants were older women who threatened the tradition notion of femininity by being unmarried or sexually promiscuous. While these trials eventually ended, sexualized moral panics continued. In the 18th and 19th centuries a masturbation scare that spawned in Britain led parents, teachers, and doctors to shackle and mistreat countless children (Herdt 2009:8). More recently, scares surrounding satanic ritual abuse and exaggerated pedophile practices have led to false imprisonment and social ostracism among those wrongfully accused due to “recovered memories” unveiled through hypnosis. Additionally, in the early 2000s, religious figures claimed that the AIDS virus could pass through condoms or might even be deliberately placed in some, giving the claimers a powerful platform to promote sexual abstinence. This false claim does not discourage sex, it just discourages safe sex, and the repercussions of sexually transmitted disease contraction can be fatal. Gilbert Herdt states, “sex education has been systematically destabilized in the United States through moral panics” (2009:2).

Other moral panics have spurred more passive dangers, but still cause harm. In the 1930s in the United States, an unjustified panic about the perceived dangers of marijuana led to the criminalization of the drug (Goode and Ben-Yehuda 1994:153). While the scare does not exist on the same level today, the drug is still stigmatized. Consequently, marijuana, which has been shown to help ease pain, decrease muscle spasms, relieve nausea, and control diabetes, is denied to many who would benefit from its medicinal properties (Alpert 2013; Borgelt et al. 2013). Strangely, other types of (possibly more harmful) medication have been readily consumed. During the 2001 anthrax scares, for example, sales of Cipro (a prophylactic antibiotic) increased by 40 percent (Clarke and Chess 2008:1002). Readily
consuming unnecessary drugs can lead to active harm like dangerous side effects, not to mention superfluous medical debt. On a more passive level, overreliance on unnecessary drugs creates false hope and can inhibit further scientific research. Damian Thompson reports, “according to GlaxoSmithKline, 90 per cent of new drugs work in only 30 to 50 per cent of patients” (2008:75). Yet these ineffective drugs are prescribed as quick fixes. Of course many prescription and non-prescription drugs are beneficial and save lives, but those consumed due to moral panics can hinder scientific medical progress because they, like pseudoscientific claims, provide false remedies for conditions that need to be further investigated.

In Discourses on the First Ten Books of Titus Livius, Niccolo Machiavelli writes “wise men say, and not without reason, that whoever wishes to foresee the future must consult the past” ([1513] 1882:Third Book, chap. XLIII). Nowhere is this truer than in the case of moral panics. Hastily accusing innocents, preventing accurate sexual education, and denying helpful remedies while distributing false hope all harm individuals and society as a whole on active and passive levels. Latent moral panics are not exempt from this fate; pseudoscientific claims produce both active and passive harm.

**ANTICIPATE THE FUTURE**

Unbeknownst to voters, president Ronald Reagan and his wife relied on an astrologer for private and public matters (Sagan 1996:19). Belief in astrology or aliens may seem harmless and in and of itself it is. Harm ensues when that belief is used to explain or justify historical or current events. It is impossible to tell whether Reagan’s love for astrology affected the American public in any way, but it is chilling to consider that bills may be passed or vetoed based on planetary alignment. Likewise, a general acceptance that aliens aided in building the pyramids could harm even those who do not believe.

In Chariots of the Gods von Däniken claims that we have no possible answers for how the Egyptians built the pyramids and not a single clue as to why they built certain ones where they did. This bold statement severely undermines the ability of historians, archaeologists, anthropologists, and Egyptologists to interpret the past. If we believe von Däniken’s claims, we are subscribing to a mentality that disregards scientific efforts to decipher a great ancient society. Even worse, the concept of ancient astronauts demeans an
entire civilization by suggesting that the society was inept. von Däniken uses words like “primitives,” “savages,” “jungle people,” and “heathens” to contrast the ancient Egyptians with the glorious ancient aliens. His labels also place the ancient society on a lower level than both the present and past Western world. Feder finds it curious that “von Däniken never wonders who helped the ancient Minoans build the great temple at Knossos or the Greeks the Parthenon, or which spaceman instructed the Romans in constructing the Colosseum” (2014:241). When claims are made to validate our superiority as a current human race, or even as a Western race, arrogance and racism have a stable breeding ground. The cultural superiority von Däniken presents to his readers can be used to justify other, more harmful causes. It gives us reason to look down upon less technologically advanced societies and justifies colonization similar to that which the ancient astronauts imposed on ancient Egypt.

But this harm is not constrained to his readers. von Däniken’s hypotheses have permeated into Hollywood movies and television shows. One show, Ancient Aliens, appears on the History Channel. This is especially appalling because the show labels von Däniken’s claims as historical and places them along side other, more reputable television biographies. If becomes difficult for the consumer to separate science from pseudoscience, history from entertainment, and fact from fiction.

Accepting pseudoscientific claims can be harmful on a physical level as well. Fad diets like the Paleolithic diet are harmful because the diets often act as a self-diagnostic tool for what might be real, harmful conditions (McBean and Speckmann 1974:1072). The diet claims that our ancestors were rid of numerous ailments, including cancer, diabetes, and autoimmune diseases, thus implying that the diet will help practitioners be free of these illnesses as well (Paleo Diet n.d). Glassner relays Susan Sontag’s emphasize on this dangerous practice: “the metaphoric trappings that deform the experience of having cancer have very real consequences: they inhibit people from seeking treatment early enough, or from making a greater effort to get competent treatment” (1999:153). Without proper treatment, serious illnesses and diseases can spread and cause irreversible disability or death. Cordain’s pseudoscientific methods cannot replace the scientific treatments available in the United States and other parts of the world. Current treatments for the ailments the Paleolithic diet claims to heal are not always successful; however, they are our best option since the treatments have undergone the rigorous scientific process. Fad diets like the Paleolithic diet
undermine these current treatments, the scientific processes that led to them, and the scientists that spent lifetimes working to rid our society of illnesses. Additionally, the diet disregards legitimate nutritional research. Damian Thompson notes that media nutritionists push, “boring but accurate claims of qualified dieticians to the margins” (2008:86). Real scientific nutrition facts may not appear as exciting as the Paleolithic diet and, thus, not receive as much attention or funding. Unfortunately, when faith in a pseudoscientific fad grows, the money that is funneled into it drains money from other, more reliable endeavors.

The extent of the Paleolithic diet’s harm does not end with the medical condition of its independent followers; it reaches into multiple disciples and threatens a greater population. This is because of the diet’s unique reliance on faulty historical data. As proved in Chapter 4, Cordain manipulates anthropological and archaeological findings to fit his pseudoscientific claims, which threatens these fields of study. Among the general public, the diet’s popularity outweighs that of lengthy academic articles back by legitimate research. Because of its popularity, Cordain’s information will spread faster, reach more audiences, and create a body of knowledge on which one can compare other findings. For example, in addition to a Paleolithic diet, some followers encourage an overall Paleolithic lifestyle. University of Minnesota biologist Marlene Zuk (2013) notes that following this lifestyle includes running barefoot in short bursts, polygamy (optional), and “attachment parenting” where a mother never leaves its child’s side. Arguably, some of these practices are likely harmless. The creation of an overall paleo-lifestyle speaks to the success this illegitimate idea has gained and shows how other, possibly more harmful, historical misconceptions can spread to multiple facets of our daily life.

Like the Paleolithic diet, the Dianetic technology employed by the Church of Scientology promises to solve all your problems, including physical and mental ailments, through science. Additionally, the Church of Scientology imposes isolation, active harm through violence and government espionage, and passive harm through medical denunciation.

Scientology has often been referred to as a cult. While academics debate over the true definition of a cult and whether the term justifies its negative connotation, many Scientology practices correspond to the dangerous aspects cults may present. Psychologist Lee J. Richmond (2004) suggests posing the following questions when considering the dangerous
nature of a cult: Does it use mind control techniques? Does it exploit members financially? Does it claim to have an exalted status? Does it attempt to position itself in opposition to society? Does it bring about physical or mortal harm? With regards to Scientology, the answer to all of these questions is yes. The recently released book *Going Clear* by Pulitzer prize-winning journalist Lawrence Wright (2013) provides us with justification for this answer. Scientology uses mind control techniques through the auditing sessions, which attempt to bring the pre-clear to an altered state where they are encouraged to confess to acts they may or may not have committed. According to defectors, these confessions take the form of blackmail if a member leaves the church. The church also exploits its members financially by promoting those who make large donations to a higher status. In contrast, those who leave the religion are fined hundreds of thousands of dollars for the auditing services they received. The exulted status is achieved through the large donations, made mostly by celebrities, and through its claims that the only way to total happiness is through Dianetic technology. This elite status, along with its secretive nature, isolates Scientology and its members from the general public. The church labels those who question the religion or those who try to dissuade friends and family from participating in the religion “suppressive persons.” Often, members are banned from talking to these “SP”s and forced to divorce spouses, alienate parents, or abandon children. To further isolate members, the church strongly discourages them from looking into the allegations made against the religion. Worst of all, the church’s false medical claims and their denunciation of modern medical practices can cause considerable physical and mental harm.

The physical harm and mental harm caused by Scientology takes both an active and passive form. In Wright’s (2013) interviews with ex-members, the interviewees relay stories of active harms, including physical beatings, detainment, starvation, and forced abortions. The church denies the violence (allegedly imposed by church leader David Miscavige) but many of those who have spoken out have faced harsh retaliation. In a 1977 raid, the FBI discovered documents for “Operation Freakout,” the goal of which was to get journalist Paulette Cooper, who had previously infiltrated the religion and written about it, imprisoned or confined to a mental institution. The raid also revealed proof of “Operation Snow White,” an operation where members infiltrated numerous government entities, including the IRS, the Federal Trade Commission, the FDA, and the departments of Justice, Treasury, and Labor.
Wright notes, “nothing in American history can compare with the scale of the domestic espionage of Operation Snow White” (2013:152).

Passively, Scientology causes harm by denying proper medical care. In 2004 the Church of Scientology campaigned against The Mental Health Services Act, which aimed to create a “system that promotes recovery/wellness for adults and older adults with severe mental illness and resiliency for children with serious emotional disorders and their families” (California Department of Health Care Services n.d.). While the act passed, the church continues to try, in the words of church leader Miscavige, to “eliminate psychiatry in all its forms” (Wright 2013:366) and even declares that mental diseases do not exist. In Going Clear Wright recounts the consequences Scientology has faced by denouncing psychiatry and mental illness. For example, in 1977 prominent Scientologist Yvonne Gillham suffered a stroke, resulting in her hospitalization. While there, doctors found a brain tumor, a tumor that would have been operable had she sought medical attention sooner. She did not seek out this attention earlier because of Scientology’s aversion to traditional medical practices. Later, in 1995 a woman who was declared clear suffered a mental breakdown. She subsequently died of a pulmonary embolism on the way to a hospital where a church-affiliated doctor practiced. She was only taken to the hospital after going into a coma, and her transporters passed five non-affiliated hospitals on the way to their destination. L. Ron Hubbard personally suggested remedies for various ailments including replacing breast milk with boiled barley and corn syrup, and ingesting harmful levels of niacin to purge the body of toxins. Hubbard also denounced anti-seizure medication, which Scientologist John Travolta’s son had required before his parents took him off it. Jett Travolta subsequently died of a seizure. The consequences of denouncing modern medicine in exchange for pseudoscience cannot be understated, particularly when pseudoscience is disguised by both science and religion. Many religions denounce modern technologies or medicines for various reasons, but Scientology does so in the name of science. This puts the Church of Scientology in a unique position to appeal to both a scientific minded and religiously skeptical audience. Other religions have their place in society, but “it is a different matter to use the protections afforded a religion by the First Amendment to falsify history, to propagate forgeries, and to cover up human-rights abuses” (Wright 2013:439). In this way, Scientology both denounces real science, and defames religion.
Only after we acknowledge the harmful effects caused by pseudoscientific acceptance can we attempt to solve the latent moral panics. Yet despite the terrors that pseudoscientific claims unleash, and despite their logical fallacies, we still tend to cling to the claims perceived validity. We still try to assuage our hidden fears with false solutions. It seems that for pseudoscientific claims to be successfully accepted they need to be more than just a solution to misplaced fear. They must also be presented in an appealing, convincing way. To revisit Glassner’s proposal regarding the journey from a fear to a panic, the fear must be publicly expressed by “organized, movement-like activity launched by middle-level interest groups” (1999:167). As mentioned previously, the fears underlying latent panics by nature lack this articulation. Instead, their pseudoscientific manifestations need this publicity to sustain acceptance. The following two chapters investigate the interest groups behind the pseudoscience, the authority figures they present, and how they use media to their advantage. Investigating the roles these agents play in a latent moral panic lifecycle can help shed light on possible diminution tactics.
CHAPTER 7

POWERS OF PERSUASION

Pseudoscientific solutions cannot exist without a creator and cannot persist without adequate promotion. But how does their creation and promotion influence whether or not one accepts the claim as fact? Successful acceptance of pseudoscientific solutions relies heavily on the rhetorical skills of the authors and the extent of endorsers. The authors’ talents, the interest groups that promote the authors’ claims, and the means of communication all play vital roles in forming and sustaining pseudoscientific acceptance.

To revisit Feder (2014:23), we must remember to consider who is making the claim and what agenda they have for making it. Even after a claim is proven pseudoscientific, considering who makes the claim can provide insight into whether or not the claim is socially accepted. Part of what makes the claims presented in this paper more believable is the use of authority figures, or “argument from authority”. Claims are more easily digested when authors and creators use authority figures because these publicly respected players act as witnesses and creditors to the claim. In relation to pseudoscience, I identify “authority figures” as those who embody the values of the society in which they reside and promote their claims. In modern-day America, this includes people who hold high educational degrees or have impressive titles, and those who are easily recognized, like politicians and celebrities. Such a broad definition may seem problematic, but, as we shall see, the rhetorical devices used by those who promote pseudoscientific claims ensure almost anyone can become a credible source. Before identifying how pseudoscience promoters use authority figures to legitimate their claims, it is necessary to examine why authority figures exist and to explore how we determine who is deemed authoritative. In other words, who captures the public interest so compellingly that they believe pseudoscience?

AUTHORITY AND THE PUBLIC

Exploring the arguments from authority that specific pseudoscience case studies represent, poses the questions: why do we believe whom we do? Why do we rely on others’
statements rather than our own opinion? To answer these questions, we need to consider the complex relationship between authority and the general public. Bath Spa University social anthropologist Rosemary McKechnie states, “the whole of society participates in identifying ‘science’ and ‘expertise’, as it does in the identification of any important symbolic boundary” (1996:130). Identification of authority, or expert, is thus a symbolic gesture rather than a method based on concrete, measurable characteristics. If this recognition is so undetermined, why are authority figures needed in the first place? The perceived dichotomy between authority figures and the general public speaks to a deeper need to categorize and label people and ideals. Sociologist Alan Irwin and Lancaster University professor Brian Wynne (1996:2) observe the nature of scientific debates pressures the general public to either accept or reject a claim. Thus, there is no room for ambiguity, and, as explained earlier, when confronted with a problem that has the potential to expose underlying fears and create a latent moral panic, ad hoc solutions are often comforting and quickly accepted. The pressure to accept or reject a claim makes it necessary to rashly identify authoritative figures in the first place. Thus, an “us” versus “them” mentality takes shape. There are those who know and those who do not know, and we need labels to identify who does know and who can be trusted in order to make a decision and to pick a side. Furthermore, the labeling of this authoritative, all-knowing figure is culturally defined. McKechnie states, “individuals are credited with authority and respect only if their self-presentation is consistent with local values” (1996:133). In the following examples, I explore how each argument from authority is attributed to the culturally relevant values the authorities embody.

**THE AUTHORITIES**

Dr. Loren Cordain capitalizes on public fear by using his health science credentials to propose a hypothesis that is based on faulty anthropological data. The nutritional science behind the Paleolithic diet may hold some credence, but that accuracy does not transfer to other scientific disciplines. Often, providing one scientifically accurate fact is enough to establish a presenter’s credibility. Subsequently, they can promote faulty data seamlessly. With Dr. Cordain’s title and educational credentials, it seems silly not to believe his claims. In a society where illness is no longer treated by priests or magical medicine men, we need to believe that science and doctors know best. Reliance on science is evident on Dr. Cordain’s
Paleolithic Diet website, which claims that the conclusions are based off “decades of research by Dr. Loren Cordain and his scientific colleagues” (Paleo Diet n.d). If current society did not demand scientific evidence to believe such a claim, Dr. Cordain would not have made it a point to include such vague statements. Dr. Cordain assumes, and assumes correctly, that his title will act as evidence supporting claims that lie outside his field of expertise. Even if he were operating within his discipline, we cannot automatically assume his conclusions are sound.

Erick von Däniken applies an argument from authority tactic as well. While von Däniken is not an authority figure per se, he is convincing because he abuses other, credible, sources as stepping-stones to his argument. Chariots of the Gods plays off of Carl Sagan’s suggestion that there is a possibility that aliens visited us (Feder 2014:219). But Sagan is merely making the point that alien contact is possible. Not proven, not even likely, just possible. Problems arise when von Däniken uses Sagan’s words as viable evidence supporting his claims and when he turns this suggestion from authority into an audacious declaration. So why go through the trouble of using Sagan as a source if his quote can easily be deciphered as a suggestion and not a truth? von Däniken recognizes that to reach a broader audience, he needs to appeal to the people who base their views about alien life on astronomers, astrophysicist, and other scientists who study outer space. A claim made by a psychic or a religious official would not have as much credence because von Däniken’s intended audience recognizes science as the means through which to correctly identify existence of aliens. Thus, a statement from someone the readers define as an authority figure, even if taken out of context, is better than a more concrete statement from a less authoritative figure. By distorting a quote from a legitimate source, von Däniken not only insults an accomplished scientist, but also ensures his own arguments are taken seriously by those who do not investigate further.

Scientology too capitalizes on opinions from scientists. The church’s website is riddled with scientific-jargon-filled claims that Scientology “developed a workable technology,” “was made possible, in part, by advances in the physical sciences,” and “draw(s) on the same advances in knowledge that led to the understanding of nuclear physics” (Official Church of Scientology n.d). Using key words like “technology” and “science” help endorse the church’s claims much like von Däniken’s, but without even
presenting a specific authority figure. When considering Scientology, new religions specialist James R. Lewis observes, “any religion claiming to be scientific [draws] on the prestige and perceived legitimacy of natural science” (2009:8). The rhetoric surrounding Dianetics and Scientology proves just that. The very name “Scientology” even commands acknowledgement based on its reference to an esteemed discipline.

Perhaps the most impressive use of the argument from authority comes from Hubbard’s *Dianetics: The Modern Science of Mental Health*. In this self-proclaimed “handbook of Dianetic procedure,” L. Ron Hubbard presents an appendix titled “The Scientific Method,” which explains how to correctly develop scientific theories. Interestingly, the appendix states, “argument by appeal to authority is of no value whatsoever” (Hubbard 1950:310). This appendix was not written by L. Ron Hubbard, but by fellow science-fiction writer John W. Campbell Jr. At the conclusion of the appendix, Campbell refers to himself as a “nuclear physicist.” According to the Encyclopedia of Science Fiction (2014), Campbell did not receive a higher degree than his Bachelor’s in Physics from Duke, and there is no evidence of his involvement with nuclear physics outside his fiction writings. Hubbard plays off positive public acceptance of science by using a real expert incorrectly and by using a figure with inflated credentials to promote his book while communicating the dangers of doing just that.

To further endorse the claims behind Dianetics and promote the ideologies behind Scientology, the religion takes advantage of celebrity culture. According to contemporary religion specialist Carole M. Cusack, the celebrity culture “render[s] Scientology ‘familiar’ and ‘mainstream’” (2009:389). She also notes, “celebrities function as contemporary saints, idols, and/or demigods of the post-Christian world” (Cusack 2009:392). Their status as god-like speaks to the emphasis American culture places on material wealth. Similar to figures worshiped in older religions, celebrities act as role models whose life we seek to emulate, and Scientology “forms a core element of [their] lives” (Cusack 2009:389). By following what a celebrity does, one is that much closer to obtaining celebrity status, and by utilizing the role of the celebrity, Scientology ensures a solid presence within the general public.

Erich von Däniken, Dr. Loren Cordain, and Scientology advocates are very good at communicating their claims by using the “argument from authority” rhetorical device, either through self-promotion or through reliance on outside authority. The “argument from
authority” tactics are so well deployed that one might wonder whether pseudoscientific authors actually believe what they are promoting. Surely L. Ron. Hubbard knew Campbell was not a practicing nuclear physicist. But, Hubbard’s eccentric past suggests that he might have believed what he wrote and so deemed this exaggeration harmless. In contrast, he was a science fiction writer and admitted that religion was where the money was (Wright 2013:100). Dr. Cordain seems to believe that the Paleolithic diet is genuine, probably because his focus is on the nutritional benefits, which may have scientific underpinnings. von Däniken also seems to be entranced by his fantastical claims. His enthusiasm and preconceived hypotheses narrow his interpretation of archeological finds and affirm what he wants to believe. The ambiguous stance authors take on their own claims speaks to their ability to correctly utilize the “argument from authority” rhetorical skill. In this way, even if members of the general public do have doubts as to an author’s credibility, “the informed opinion of expert judges serves as a functional alternative” (Clarke and Chess 2008:997).

Those who assume authoritative positions help construct or build upon ideologies that promote a solution to an underlying fear. But Sagan observes that, “in science there are no authorities; at most, there are experts” (1996:210). These authority figures then are just that: figures. They act as socially constructed personifications of culturally valued ideals. The authority behind the Paleolithic diet represents our trust in high educational degrees, regardless of their relevance to the topic. von Däniken’s authorities are trusted experts but they become empty figures when their expertise is taken out of context or warped into illogical conclusions. Finally, Scientology uses celebrities as a personification of the American ideal lifestyle. Yet, these metaphorical authority figures continue living because of our need to determine whom to trust to make a decision.

**INTEREST GROUPS**

As powerful as authority figures are, pseudoscience acceptance requires more than just name-dropping to gain acceptance from the general public. Glassner states, “the short answer to why Americans harbor so many misbegotten fears is that immense power and money await those who tap into our moral insecurities and supply us with symbolic substitutes” (1999:xviii). As the general public, we need these pseudoscientific substitutes. But authors with authority figures by their side cannot supply us with the substitutes alone;
they require additional help from groups with similar interests and agendas. Goode and Ben-Yehuda (1994:161-165) theorize that certain interest groups with specific agendas promote specific panics to address their cause. Interest groups promoting pseudoscientific claims include book and magazine publishers, entertainment companies, dieters, food producers, religious sects, and a slew of other groups who can benefit by replacing our fears with pseudoscientific solutions. Feder (2014:10-12) offers some motives for pseudoscientific promotion that can shed light on interest group agendas, including money, fame, nationalism, racism, religion, romance, and just plain mental instability. We saw from previous examination how some, if not all, of these factors contribute to the authors’ promotion or creation of a claim. The same motives can also be applied to the interest groups that back those claims. Certain interest groups will latch onto and sustain a latent moral panic because the result of that panic, a pseudoscientific claim, can help them achieve one, if not all, of the above motivators.

Authors of pseudoscientific claims take advantage of our previously held fears and further perpetuate them through the interest groups that have the most to gain from sustained public fear. A mutual dependency exists between these interest groups and the authors with whom they associate. Authors of pseudoscientific claims depend on interest groups to promote their claims and the interest groups rely on pseudoscientific authors for a platform from which to promote their own product or service. But, for these interest groups to successfully propose pseudoscientific claims and profit from public acceptance, they must “persuade the audience that they have a problem whose solution is the item being advertized” (Glassner 1999:66). In the next chapter, we will explore how interest groups use various mediums to achieve this goal.
CHAPTER 8

IS THE MEDIA THE MESSAGE?

Claims are more easily digested when authority figures and interest groups are involved because those players embody more power than the public, along with power over the public, and, thus, are in a position to propel change in thought. They can only achieve this power through properly employed mediums. Glassner observes that, “a scare can continue long after its rightful expiration date so long as it has two things going for it: it has to tap into current cultural anxieties, and it has to have media-savvy advocates behind it” (1999:177). I have shown how pseudoscientific claims survive off cultural anxieties but we need to explore how the “media-savvy advocates” help exploit those fears.

The term “media” often refers to the interest groups or organizations behind specific, tangible forms of communication. In our case we need to consider the actual mediums through which the “media” and authorities distribute their claims. In the words of Marshal McLuhan, “the medium is a message” (1964:7). To McLuhan, the medium through which a concept is delivered is more important and more consequential than the concept itself. Pseudoscience, when propagated through specific mediums, is absorbed and processed differently depending on the medium employed. The medium then is just as important to consider when analyzing the acceptance of pseudoscientific claim as the content of the claim itself.

As eagerly as McLuhan’s suggestions are embraced, they are refuted as well. Douglas Davis, an American artist, critic, and university professor, states “the medium is not the message…the ultimate power lies here, in [the viewer’s] eyes and mind, not on the ‘other’ side of the screen” (1993:38). Davis points to the handheld video of Rodney King’s beating as an example where the content of the issue “overwhelm[ed] the medium in which it [was] presented” (1993:21). To Davis, the King videos spurred outrage not because of the medium through which it was presented but solely because of the content. Perhaps both parties are correct. Content may have the power to override a medium in extreme circumstances but we
cannot deny how mediums, especially in the long run, actually change how we send and receive information.

The power of specific mediums to alter changes in perception has recently been supported by neurological studies, like those presented in Nicholas Carr’s Pulitzer prize nominated book *The Shallows*, which prove that our minds function differently when exposed to different mediums. In *The Shallows* Carr states,

> the tools man has used to support or extend his nervous system— all those technologies that through history have influenced how we find, store, and interpret information, how we direct our attention and engage our senses, how we remember and how we forget— have shaped the physical structure and workings of the human mind. (2010:48)

Furthermore, the natural plasticity of the human brain ensures that future mediums will continue to alter the way we interpret information (Carr 2010). It seems McLuhan was right; the medium through which one presents and receives information alters the processing and response to such content, even if the content seemingly overwhelms the medium.

Conceding that mediums do in fact change messages, or at least alter the way they are received, can shed light on the acceptance of the aforementioned pseudoscientific claims. Stanley Cohen emphasized the role of media in moral panics and suggested that media can be involved in “setting the agenda, transmitting the image, and/or breaking the silence, making the claim” (2002:xxiv). Cohen’s realization is notable both in the 1960s and 1970s (when he first wrote about moral panics) and presently, von Däniken, Paleolithic diet enthusiasts, and Scientologists all make use of print and electronic mediums, specifically, books and magazines, television programs and movies, and the Internet and social media to set agendas, transmit images, and make claims. But is it possible that the means through which these false claims are distributed affects their acceptance? I argue that it is not only possible, but overwhelmingly probable, and we have the “media-savvy” pseudoscience advocates to thank for that.

**PRINTED MEDIA**

As discussed previously, the successful acceptance of a pseudoscientific claim rests on its ability to seemingly assuage an underlying fear. The content then is, as Davis (1993) suggests, important because it captures the audience’s attention. The pseudoscientific content is what spurs the reader to read in the first place. But, the medium is important to consider as
well. von Däniken, Paleolithic dieters, and Scientologists all take advantage of the power of 
the printed medium, a medium made readily available by the printing press. While the print 
medium may seem like a relic compared to digital media today, its impacts are as strong as 
ever.

To really examine the impact books and the printing press have on the general public, 
we can look to the past. The relationship between the print medium and moral panics is 
evident in one of the most iconic moral panics: the witch hunts in early modern Europe. The 
invention of a new medium, the printing press, in the late 1400s played a large role in the 
spread of this panic in that it allowed easy access to materials that spread the “truth” about 
witches. Around the year 1500, German Dominicans Heinrich Institoris and Jacob Sprenger 
mass published their book, the *Malleus Maleficarum* (Latin for “Hammer of the Witches”), 
to spread the word about the dangers of witches (Broedel 2003). Similarly, during the 
Reformation, Protestant leader Martin Luther took advantage of the printing press to 
distribute his Ninety-Five Theses, which propelled the Protestant Reformation and 
contributed greatly to witch-hunting. Without the invention of the printing press, the message 
would not have spread as fast and would not have reached as many people. Without a mass 
of people embodying and propagating fear, moral panics cannot flourish.

For early modern Europe, the medium was indeed the message. The medium allowed 
more people, specifically laypeople to access information produced by a select few. 
McLuhan states, “the ‘message’ of any medium or technology is the change of scale or pace 
or pattern that it introduces into human affairs” (1964:8). The printing press in early modern 
Europe controlled the scale of people who were exposed to the literature and thus increased 
the scale of the moral panic. Perhaps in early modern Europe it was not the printing press per 
se that fueled the panic but it was simply that the medium allowed for mass consumption in 
general. Since then, the print medium has developed. The print medium today differs from 
those of the past in that it brings with it a new type of danger because it does not seem to 
demand as much skepticism as it should.

We have been taught that Hollywood camera tricks can skew a visual image and most 
people understand that what is written online can come from anyone. But it is easy to forget 
that the same goes for published books. von Däniken’s fantastical claims were first made 
public in print form in his book *Chariots of the Gods*, which has since been translated into
different languages and sold millions of copies. Seems pretty credible right? But just because von Däniken has a book deal does not mean his claims have been reviewed and accepted by reputable sources. Likewise, he uses rhetorical tricks (like the appeals to authority mentioned in the previous chapter) that might go unnoticed by a modern television audience. His success, therefore, may lie in the power of his chosen medium. By presenting his claims in a form that is largely employed by scientists and academics, he enhances his reputability and blends his work in with reputable and peer-reviewed works in the field of archaeology. Similarly, L. Ron Hubbard used his established connection with the literary world to promote a scientific-sounding handbook that reads like an academic piece of non-fiction. Loren Cordain too uses the print medium to publish magazines, cookbooks, and self-help books that can be found in the dietary or nutrition sections of major bookstores. In this way, the printing press, in replicating words, replicates fear and pseudoscience, and their consequences.

**Visual Media**

Sven Birkerts, director of the Bennington College writing seminars, notes, “with visual media… impression and image take precedence over logic and concept, and detail and linear sequentiality are sacrificed” (1994:122). von Däniken realized the power of the visual medium in his work and supplemented his writings with pictures, or “proof,” of his findings. In one instance, Däniken shows the viewer a picture of cave art that he claims is an ancient replication of an alien visiting the cavemen. The picture is proof that what he is claiming to be true. Even though the drawing looks like what you might find in any child’s sketchbook, von Däniken’s preceding narrative primes the viewer to see the alien in the squiggles. John Berger notes in *Ways of Seeing* that, “the way we see things is affected by what we know or what we believe” and “we only see what we look at” (1988:8). When a viewer looks for the so-called ancient alien in the cave art, it is the ancient alien that they see. If von Däniken’s story had been about an ancient sea creature, I have no doubt that the very same picture would provide adequate proof of the creature’s existence.

The picture-as-proof phenomenon has only intensified with the development of the still picture to the moving picture. The photographer, now the videographer, has the ability to tell a story with pictures and can guide the viewer’s point of view. McLuhan notes that movies are created by personal motives but those are accepted “subliminally and without
Unlike how a book *tells* us, a film *shows* us, which makes the viewer believe that he or she is making his or her own interpretation of real events. In actuality, a video recording is just as much a retelling of events as a book is, but since “seeing is believing” writers, directors, and actors can persuade viewers that what they are portraying is actuality. Unscripted programs like news segments may seem to be an exception, but programmers still employ their powerful medium to skew how we think. Glassner observes that, “television news programs survive on scares” (1999:xxi). Evidence of this is clearly visible in the abundance of horrific new stories broadcasted on television every day. Even though the tragic accidents the news stories portray are often rare occurrences, the repetitive loop of scenes is enough to compel one to buy extra insurance, to quit buying a certain brand of medicine, or to start a new diet. Those involved in the television and film industries use its powerful medium to spread content that will ultimately lead to the medium’s (and thus their own) longevity. The content then needs to inspire fear in the viewers, who then adopt pseudoscientific claims to assuage those fears and buy products from interest groups who in turn utilize the mediums that contributed to their gain.

We see von Däniken and Scientologists using this medium to their advantage. von Däniken’s claims transitioned from the book to the silver screen in the 1970s and more recently his views have been adapted to the television show *Ancient Aliens* on the History Channel. A channel devoted to history is now broadcasting pseudoscience because the demand for such entertainment is high. Scientologists also take advantage of the visual medium through a secondary medium: celebrities. As discussed previously, the celebrities engaged with the church help lend the religion an air of legitimacy and popularity. But this popularity would not exist without the popularity of film and television mediums. Likewise, Scientology would not be where it is today without the free form of advertisement it gains when Scientologists like Tom Cruise or Will Smith star in blockbuster films.

McLuhan observed correctly that, “owners of media understand their power is in the medium, not in the content they present” (1964:216). Channels like the History Channel know that since the medium is the message, they must broadcast likeable, albeit fake, content through their medium in order to sustain the medium. Likewise, television news programs need to skew the ratio of interesting material to boring (although probably more useful) material. The accuracy of the content is irrelevant. Television stations know that as long as
they continue to pump out anything through their popular, engaging medium, their medium will survive. Otherwise, if the television medium ceases to make a profit, newer, or possibly older, technologies will take its place in society. Propagators of pseudoscience recognize this moral ambiguity and take full advantage.

**SOCIAL AND INTERACTIVE MEDIA**

Perhaps more influential than books and moving pictures is the Internet. Today, more than ever, fast, easy-to-access content is literally at our fingertips. The online medium assures that the content, regardless of its accuracy, is accessible by millions and interactive in nature. The Internet medium not only influenced its users, but also allows one to contribute back. It encourages, sometimes even forces, commitment and participation (McLuhan 1964:5). Comment boards for articles and heated debates in forums propel immediate responses, often ones that, due to the anonymity of the medium, are harsher and less thought out than responses one might find in a literary review. The easy access and anonymity of the Internet allows everyday people to produce information for mass reception, unlike other mediums where money or status is often required to distribute content. Of course, the magnitude of liberty and freedom of speech the Internet provides contributes positively to a democratic system and no one should suggest that only certain “credited” individuals should publish Internet information. Now, accessing information on the Internet requires a new degree of skepticism and caution.

Navigating web pages and blog posts to find out the true source of the information takes more time and effort than looking for an author and publisher on the inside cover of a book. The challenge is compounded by the unique way the Internet as a medium affects our brains. Carr (2010) relates the results of numerous studies on eye movement among online users and concludes that the users’ eye movements do not follow a linear pattern but rather jump around the page. Furthermore, this jumping causes online viewers to read only about 18% of the content on a given web page (Carr 2010). The multitasking nature that Internet use requires results in less time on a web page and less effort to deeply understand the content that is presented. In brief, asking users to verify the sources of information online is a ridiculous request. Compound that with the underlying fears users are looking to assuage and you have the perfect recipe for pseudoscientific acceptance. A simple Google search on
healthy diets will lead you to Loren Cordain’s website where his title of doctor is displayed and where numerous snippets of information are available for fast, easy consumption. The Scientology website too is full of mini-videos and short testimonials that allow the viewer to get a positive glimpse of the religion before moving on to other tasks. These other tasks generally include some type of social media, which does an excellent job of propagating “facts.”

Carr recognizes the consequences of the social mediums: “social concerns override literary ones” (2010:107). He also notices that in addition to the anonymity that online media provides, acceptance of pseudoscientific claims might also be affected by the self-consciousness that social media causes: the “resulting self-consciousness—even, at times, fear—magnifies the intensity of our involvement with the medium” (Carr 2010:118). It seems our need to connect, to instantly connect, to others on the Internet overpowers our need to verify information or spend any time worrying about information that is a second old. We fear that being one second behind the times will affect our image and thus we compulsively seek to absorb snippets of information from different web pages. Unfortunately, science by its nature cannot match this up-to-the-second demand for new information. Science’s necessary rigorous methods prevent new information from appearing as quickly as a celebrity might update their social status. It is the fresh, albeit irrelevant, information that demands our attention as online users, not the day-by-day “we are waiting for results” type statuses that scientists might write if they too employed this medium in the same way.

**CAN WE CHANGE THE MESSAGE?**

Sociologist Chas Critcher observes, “media and popular culture are vital to sustaining fear” (2011:259). The aforementioned mediums employed by pseudoscientific producers and interest groups each contribute to sustaining the fears in their own unique way, meaning we not only have to consider the content that is propagated, but the mediums through which they are received. The power of print lends credit to von Däniken’s, Scientologists’, and Loren Cordain’s claims; visual media shows us “proof” and produces popular spokespeople; and social media affects how we read and process information and thus successfully provides up-to-the-minute, easy-to-process pseudoscientific content to instantly and conveniently quell
our fears. To some, like Davis, the medium may not be the message, but there is no denying, “all media work us over completely” (McLuhan et al. 1967:26). How then can scientists and skeptics use these mediums as agents of change? Davis notes that, “since TV is assumed to be dangerous to intellectual health, our school systems and universities have tended to ignore its powerful potential as a teaching medium” (1993:102). Carr also notes the positive powers of mediums, stating the initial mass production of books caused political and religious uprisings and led to the “ascendancy of the scientific method as a central means for defining truth” (2010:72). But to properly analyze and propose suggestions for media improvement, we need to consider the relationship between the two groups on either side of the mediums, the communicator and the receiver. In the next chapter I will explore this dynamic relationship between science and society.
CHAPTER 9

SOCIETY AND SCIENCE: A DYNAMIC RELATIONSHIP

Thus far, my thesis has focused on society and its relationship with pseudoscience. But what is society’s relationship with science? The question is worth considering because without a thorough understanding of the science-society relationship we cannot discover effective ways to improve scientific communication.

Academic views on science and society are well established in the fields of history and philosophy. Most notably, there are internalist and externalist views. Shermer gives a brief overview of both perspectives: the internalist believes science is a “progressive, culturally independent, objective quest for Truth” while an externalist sees science as a “non-progressive, socially constructed, subjective creation of knowledge” (2002:29). Internalist George Sarton, credited as the founder of the History of Science discipline, claims that science is not influenced at all by culture (Shermer 2002:29). On the other hand, externalist Thomas Kuhn says culture plays an influential role in scientific developments (Shermer 2002:30).

The problem with the internal and external definitions is that both only focus on how culture does or does not affect science; they do not address how science affects society, at least not beyond the level of concrete effects like medical advances. Science historian Richard Olson gives the middle-of-the-road view that science is “both [a] product and producer of culture” (Shermer 2002:30). Just like no person is a product of solely nature or solely nurture, science is not a purely natural or a purely environmentally created discipline. Similarly, society is not purely natural, but also influenced by disciplines like science. We also need to examine the nature of the interactions between science and society, not just the effects these interactions produce. Brian Wynne, Professor of Science Studies at Lancaster University, writes, “the fundamental interaction between science expertise and lay-publics is cultural” (1996:21). A socially constructed gap exists between what we as society deem as “science” and what science as a discipline deems “society” or “culture.” For the purposes of
this chapter, I will use society and culture interchangeably with the shared general definition being a group of individuals existing in a structured community, specifically the United States. Furthermore, general society or culture is distinguished from science in that the individuals composing society are defined as non-experts in the field of science. This distinction may seem problematic and, indeed, it is. Keele University social anthropologist Sharon MacDonald notes, “science’ is taken as a professionalized and distinctive domain that is, by definition, bounded off from lay people” (1996:154). She also questions why people tend not to consider why this type of boundary exists in the first place. The purpose of this chapter is to explore the fluid bidirectional relationship between science and general society and to consider why such a distinction between the two exists.

**SOCIETY ON SCIENCE**

The Introduction to my thesis explained the use of the word “science” in the context of this paper. Besides my stated definition, other views need to be explored. Namely, what does the general public see as “science?” And who exactly is a “scientist?” The questions seem easy enough, but the answers are conflicting.

**What is Science?**

According to an additional definition provided by the American Heritage Dictionary, science is “a systematic method or body of knowledge in a given area” (2013). This definition, along with others previously mentioned, can encompass a wide variety of disciplines yet the popular image of science more narrow. In general, science is perceived to be something that occurs in a lab, is conducted by scientists, and involves subjects you know nothing about. How does science go from being a general process or topic to such a specific exclusive discipline? To begin to answer this question, we must consider how we distinguish science from non-science and how society situates itself with regard to science.

A clear divide between the scientific and un-scientific is illustrated in the common phrase “it is an art, not a science.” The maxim tends to apply to activities that are more creative like painting or writing and not related to the “hard” sciences like biology or physics. This view is not a recent development either. Carolyn R. Miller, co-director of the Center for Information Society Studies and North Carolina State University professor, relays Aristotle and Plato’s views on rhetoric as art or science: the early Greeks “emphasized that rhetoric
was an art” and, to Aristotle, “rhetoric was conceptualized and teachable (not a knack, as Plato had feared) but neither certain nor absolute (not a science, as Plato had hoped)” (2004b:155). To the ancient Greeks, science implied absolution and certainty, not just “knowledge in a given area”, in which case rhetoric could easily classify as science.

Goldsmith, University of London sociologist Mike Michael (1996) exemplified this distinction between science as an absolute, distinct discipline and science as just knowledge in any given area in his study (conducted with Rosemary McKechnie and Brain Wynne) about the construction of ignorance.

Mike Michael (1996) examined how a person’s expression of their own scientific ignorance places them in a certain relationship with science in general. Briefly, the study consisted of interviewing “lay people” about ionizing radiation. The study concluded that when people are confronted with scientific knowledge, they are forced to reflect upon their own understanding of science and subsequently construct a personal degree of ignorance with relation to science. Michael calls these self-ascriptions of ignorance “discourses of ignorance” (1996:112). The emphasis on construct demonstrates that people create and assume a position of ignorance in relation to scientific topics rather than emphasize what it is they do know. Furthermore, Michael (1996:116) found that what people did know, they did not themselves classify as scientific even if it was. Self-reflection on one’s own (presumed and constructed) ignorance with regards to science clearly points to the existence of a cultural division between science and the general public, a division that forces the layperson to place their self in a weaker position with regard to science. Doing so also requires putting a face to a name. But whom does society picture as the scientist?

Who is a Scientist?

Like the above assumption about science, scientists have a distinct connotation. The easiest images to decipher are the ones put forth by popular films and books. Chris Mooney, a senior correspondent for The American Prospect, and Duke University research associate Sheril Kirshenbaum (2009) observe that in Hollywood scientists are portrayed as nerdy, villainous, uncaring, and mad, all labels meant to separate them from the good people of general society. Pasit Koren and Varda Bar (2009) of the Hebrew University of Jerusalem found further support for this phenomenon with their analysis of scientists portrayed in
popular scientific and classical works. Koren and Bar (2009) found that scientists were generally portrayed as mad, monstrous, arrogant, geeky, greedy for knowledge, irresponsible, and alienated. Given the above, “it’s safe to infer there’s something about scientists that triggers a particular kind of stereotyping, and that this reflects our society’s uneasiness with the power they can sometimes wield” (Mooney and Kirshenbaum 2009:86). But are these depictions accurate representations of individual assumptions or just fictional stereotypes? To examine the difference, Koren and Bar (2009) conducted an empirical study regarding the image of a scientist among high school students. Their findings showed that out of the 144 participating high school students, only one third held a positive image of a scientist, and overall the students found scientists to be intelligent and logical but also dull and irresponsible. Because of this, Koren and Bar concluded that the views expressed by contemporary students reflect those found in literature. Whether or not the views held by students are shaped by this literature remains unclear. Either way, the negative image of the scientist is rampant both in the media and among the general public.

Along with being portrayed as nerdy or mad, scientists are traditionally depicted as male. University of Vienna sociologist Eva Flicker notes, “in all media, the scientists portrayed in the key scientific roles are, for the most part, men (82%). Women scientists are rare and when they do appear, their roles differ greatly from those of their male colleagues” (2003:308). While I believe this ratio is changing, the common depiction of the female scientist, especially in movies, is alarming. In many cases, the scientific female is not a complete character; she has to be stunningly beautiful and sexy as well. Flicker (2003:316) observes that the typical female scientist portrayed in film and television is model-like, unrealistically young, and dressed provocatively. The sexy scientist can provide some benefits in that it at least depicts the female scientist, a role that was nonexistent in the June Cleaver days. Now young women can see fictional women exist in all facets of working society. I do not argue against this progression. Of course women can be beautiful and smart, I would argue that all are. But over-sexualizing the role of the female scientist in Hollywood is counterproductive. It assumes, not surprisingly, that sexuality is all a woman has to offer, regardless of her profession. So, “despite a strong transformation of the images of women in film, the analysis shows that women’s character roles in general and those of the woman scientist in particular, are clearly subject to sexual stereotypes” (Flicker 2003:316).
Additionally, when movies and television shows do feature female scientists, they show only one, working with (and usually under) a group of males. The ratio of male to female scientists depicted in media may reflect actual statistics in the workforce, but it may also perpetuate that unbalance.

The overall negative depiction of scientists, whether it is a mad, socially inept male or an over sexualized female, can inhibit the growth of the field by defining who qualifies as a scientist. In reality, anyone can be a scientist. The notion that anyone can be a scientist may seem contradictory to the previous chapter which displayed how many authority figures claiming to rely scientific facts are not scientists. But we also saw how an academic degree, even a scientific one, does not mean the person making the claim is using the scientific process. Thus, even someone who is deemed a scientist may not always assume that role at any given time. If an archeologist claims that aliens built the pyramids, that archeologist, while normally a scientist, is not a scientist in that moment. When considering who is making a scientific or pseudoscientific claim, we need to ask ourselves: is this person a scientist at the moment they are making this statement? That is, are they using the scientific process correctly to arrive at their proposed conclusion? With this approach, anyone can be a scientist if they appropriately apply the scientific method to a given situation. Consequently, any “scientist” may forfeit that role when they chose to not follow the rules of science. The term “scientist” then is a fluid, dynamic title; a title that can come and go with regards to any person regardless of their sex, gender, race, or personality.

The answers to “what is science” and “what is a scientist?” seem more complex than ever. Is science something that is absolute and certain? Is it something done by the smarter, lab-coat wearing male “other?” Is it something that is just a process? Is it the opposite of art? Why is it that we have such a hard time pinning down a concrete definition of science when we have such a distinct vision of the concept? Perhaps the answer to this can be found in considering the opposite approach: what does science think of society?

**SCIENCE ON SOCIETY**

When comparing science and society, the natural impulse is to consider what society lacks compared to science. Like the constructed ignorance presented by Mike Michael (1996), science too projects ignorance onto society and laypeople. Irwin and Wynne
(1996:215) summarize some of the ways society or “the public” has been constructed: it is assumed that a lay person holds the same values as science does; the public is thought to be a collection of individuals with no “legitimate autonomous cultural substance;” society lacks enthusiasm for science because of the risks it poses; and ignorance is simply an intellectual vacancy that can be filled with scientific facts. While the additional essays provided in Irwin and Wynne’s compellation (including Michael’s essay noted previously) show that these common views are inaccurate, their existence is significant. Society imagines science and scientists in stereotypes and science stereotypes society and the people in it. Mooney and Kirshenbaum observe in *Unscientific America: How Scientific Illiteracy Threatens Our Future*, “the blame is said to lie with ‘the public,’ which needs to be more educated, more knowledgeable, better informed” (2009:14). The passive nature of these statements frees science from blame. We hear “the public needs educating”, not “science needs to educate the public.” Mooney and Kirshenbaum continue, “the most troubling problem with the standard ‘scientific illiteracy’ argument, however, is this: It has the effect, intended or otherwise, of exempting the smart people—the scientists—from any responsibility for ensuring that our society really does take their knowledge seriously and uses it wisely” (2009:16). Additionally, these statements assume that the society does in fact need to be educated in the first place when perhaps it is science that needs to learn more about society.

It is easy to write off everyone who believes in pseudoscience as stupid. If these believers just knew the facts, they would not accept the pseudoscientific claims, right? We know there is an abundance of scientific information readily available through various mediums. We also know the reason why people believe in pseudoscience is due to unacknowledged, displaced fears (discussed in Chapter 5). Pseudoscience, unlike actual science, does not demand such a rigorous, critical self-assessment because, while the claims are presented as science, they are not as complex and intimidating as, for example, “ionizing radiation.” The fact that pseudoscience claims to be “scientifically proven” only reinforces the science-society rift. Shermer observes, “pseudoscientists know that their ideas must at least appear scientific because science is the touchstone of truth in our culture” (2002:7). But this does not imply that science by itself is the answer. The idea that scientific fact alone provides a simple fix for pseudoscience displays the same mentality that pseudoscientific believers employ. Like pseudoscience fails to provide an adequate solution to a problem,
science can, at times, fail to provide a fix for pseudoscience. Yet the same “solution” seems to dominate: educate and inform the knowledge-less public and everything will be okay. But assuming this position only widens the gap between society and science in that it categorizes society as a mass of people who simply lack scientific knowledge. This classification is equally as problematic, though not as obvious, as the stereotypical view of science that society holds.

From the previous considerations, we can reject both the strictly internalist and the strictly externalist view on science and society. The internalist view can be discarded because science is clearly influenced by culture. The way society, in general, stereotypes people in the sciences can influence individual career paths, funding, and trust in scientific endeavors. For example, Harvard University biologist Randy Olson (2009:74) notes that the movie *Jurassic Park* positively influenced interest in the field of paleontology and the movie *Top Gun* contributed to increased U.S. Air Force enrollment. But we also cannot settle for a purely externalist view either. While culture has influences on science, the externalist view does not take into consideration the impact science has on constructing society. It seems that Richard Olson’s comment that science both produces and is a product of culture would be more appropriate.

Additionally, examining how this division between science and society manifests is important. McKechine notes, “the fluid boundaries which define and oppose ‘science’ and ‘publics’ are constantly shifting, dissolving, and reappearing” (1996:127). Currently, society and science are two exclusive bodies that have a clear perception of the other. While the boundaries may fluctuate, they have yet to disappear completely and their location is hard to determine. This is because the way society views science and scientists is inaccurate. Perhaps more importantly, science’s views on society are equally inaccurate. Without a thorough understanding of what the “other” is, we cannot hope for successful communication between the two. We may never see a day where science and society blend together, but we can work toward bridging the gap. The next chapter will focus on how this rift may be bridged through various forms of scientific communication.
CHAPTER 10

RECOMMENDATIONS

It is tempting to start this chapter with recommendations regarding how scientists can change the way society accepts or rejects scientific knowledge. Such recommendations attempt to explain unsuccessful scientific communication as a problem of audience participation or ability and should be avoided. Improving scientific communication to such a degree that discourages pseudoscience involves both the communicator and the listener. Notice that communicator and listener are not synonymous with scientist and laypeople. As explored in the previous chapter, the current perceived dichotomy between scientist and layperson is problematic. Bridging the gap means creating a cohesive social unit comprised of all disciplines. In other words, science need not be separated from other aspects of life. As famed biophysicist Rosalind Franklin wrote in a letter to her father, “science and everyday life cannot and should not be separated.”

Luckily, scientific communication is an established field that offers many recommendations for improvements. My goal in this chapter is to build upon established methods in order to make recommendations for decreasing pseudoscientific presence and acceptance with a focus on written communication. The most important questions to address are: Why do we need to change the way we communicate? How is written scientific communication an effective solution? What methods can we employ to ensure successful scientific communication? Clearly, we need a way to assuage latent moral panics other than through pseudoscientific promotion. I suggest we bridge this gap through interdisciplinary approaches to education, styles of communication, means of communication, and most importantly, through improved science-society interaction and acceptance.

A PSEUDOSCIENTIFIC REVOLUTION

The latent moral panics that underlay pseudoscientific acceptance not only cause direct harm like physical or mental damage, but also cause indirect, or passive, harm to society as a whole through its discouragement of real science. Interestingly, these harmful
moral panics may be necessary evils. Goode and Ben-Yehuda note, “moral panics are a crucial element in the fabric of social change…they are not marginal, exotic, trivial phenomena, but one key by which we can unlock the mysteries of social life” (1994:170). Through inevitable latent moral panics, we have the opportunity to apply science in beneficial ways. In a sense, pseudoscience can spur scientific revolution.

John Preston (2008), senior lecturer in philosophy at the University of Reading, portrays Thomas Kuhn’s notion of a scientific revolution as occurring when one paradigm is replaced with another, incompatible one. Preston notes that Kuhn uses the term “paradigm” in two senses: first, paradigm refers to a “concrete achievement or model from which initiates are taught”; second, it refers to larger cognitive structure shared by the scientific community (2008:23). Pseudoscience, by nature, does not carry out scientific processes nor do scientists agree upon its topics so using Kuhn’s definition of “paradigm” may not be appropriate here, but we can certainly apply his notion of revolution. The nature of Kuhn’s scientific revolution can apply in that science has the ability to completely replace pseudoscience once the latter’s shortcomings are displayed. We can construct a “pseudoscientific paradigm” which encompasses a larger system of shared scientifically unsupported beliefs and techniques based on logistical fallacy, a sort of pseudoscientific community to mirror the scientific one. With this new term, we can argue for a paradigm shift from pseudoscience and to science. To Kuhn, science always progresses and “the successive transition from one paradigm to another via revolution is the usual developmental pattern of mature science” (Preston 2008:21). Thus, progression from a pseudoscientific paradigm to a scientific one constitutes a pseudoscientific to scientific revolution.

Delft University of Technology professors Maarten van der Sanden and Patricia Osseweijer (2011) alluded to Kuhn’s model when they suggested a second paradigm shift for scientific communication. The first paradigm shift for scientific communication occurred with a 1985 report issued by the “Public Understanding of Science” committee of the Royal Society of London for Improving Natural Knowledge (van der Sanden and Osseweijer 2011:424). This report (referred to as the Bodmer Report after chairman Sir Walter Bodmer) told scientists to, “learn to communicate with the public, be willing to do so and consider it your duty to do so” (Bodmer 2011:xiii). To van der Sanden and Osseweijer, the first paradigm shift lacked focus on “embedding science communication in the organization”
Their second paradigm shift calls for a more coherent approach to scientific communication throughout the university system, “one in which scientists are encouraged by their professional academic institutions to strength and streamline their efforts in science communication and incorporate it into organisational policy” (van der Sanden and Osseweijer 2011:423). While university efforts to enhance scientific communication are important, they are not the only solution. van der Sanden and Osseweijer’s shift is evidence of “Kuhn-loss” or a situation where a successive paradigm does not answer all the problems the first posed (Preston 2008:57). While van der Sanden and Osseweijer’s suggestion is helpful and important, to fully spur a revolution from pseudoscience to science (on an individual claim level and totally), we need to investigate areas of scientific communication other than university participation. But first, why is scientific communication, specifically written communication, as opposed to other disciplines the means through which we can achieve this transformation from pseudoscience to science?

**POWER OF WRITTEN SCIENTIFIC COMMUNICATION**

To spur this pseudoscientific-to-scientific revolution, we need to initiate changes in scientific communication. For Sagan, effective scientific communication is especially important for four reasons: science provides a road out of poverty; it warns us of danger; it teaches us about where, when, and who we are; and it compliments democracy in that it “confers power on anyone who takes the trouble to learn it” (1996:37-38). The communication part of scientific communication requires special emphasis. It is not enough to possess vast amounts of information; scientists need to encode the information in ways that are palatable to the public. Contrary to the popular maxim, data do not speak for themselves. Likewise, they do not write themselves. Focusing on communication of science means addressing the means through which we communicate. This chapter will present general recommendations for the improvement of scientific communication but with an emphasis on written communication. My justification for this emphasis is based on Cambridge University professor Sir Jack Goody’s “technologies of the intellect” and on current popular (scientific and nonscientific) means of communication.

Goody writes, “writing is...a prerequisite for the development of the technologies with which our intellect engages” (2000:151). Goody refers to writing as a type of
technology of the intellect on three levels. He considers the writing materials, the storage and retrieval of information, and the “product of the interaction between the human mind and the written world” (Goody 2000:145). Written communication today is more important than ever. Traditional oral forms of communication among ancient societies (e.g. poetry and plays) gave way to written communication (e.g., tablets and papyrus) which was later succeeded by oral communication over radios and telephones. Now, these oral forms of communication have transitioned back to written communication through emails, blogs, text messages, Facebook statuses, Twitter “tweets”, and websites. Even though oral communication, as well as visual communication through videos, is widely used, these new materials available for written communication deserve investigation with regards to scientific communication because of their increased use due to the Internet.

Goody’s second level, storage and retrieval, is important because of its current immense capacity. Goody realizes that written communication wields power. It allows for indefinite storage and retrieval of information compared to purely oral communication, which is limited to human memory. Not only do we have a virtually infinite amount of storage capacity (libraries, hard drives, the cloud), but the retrieval methods are simpler than ever before. The Internet provides instant access to libraries of information, both academic and casual. One only needs a computer and Internet connection to read about everything from Justin Bieber to string theory. We can also communicate directly with one another at increasingly faster speeds.

Goody’s third level includes products that result from the interaction of the mind and writing. He provides examples including lists, tables, and labeling. All of these tools contribute to successful scientific communication because they allow for in-depth analysis of concepts, which can lead to successful rebuttal of pseudoscientific claims. Goody (2000:143) emphasizes that with writing, we can better analyze an argument by examining the beginning, middle, and end. The written form also provides opportunity to spot contradiction and inconsistency through review. These characteristics specific to writing allow for my syllogistic model, which provides a framework for pseudoscientific analysis. Without the written form of communication, deconstruction at this level would be challenging at best.

Goody writes, “it is partly the modes of communication that we or our societies have adopted that increase our capabilities (as individuals, as agents) to understand and manipulate
our world” (2000:150). If we take advantage of the materials, the means of storage and retrieval, and the products of interaction related to scientific communication, we can change the way people view science. In this way, scientific communication, specifically written scientific communication as opposed to pure fact possession, has the power to discredit pseudoscience and move society toward a more science-oriented state of mind.

**How Do We Do It?**

How can we apply the power of written scientific communication to combat pseudoscience? Luckily, this feat is possible since the plastic nature of the human mind allows us to continually absorb information and create new ways to observe and analyze our world (Carr 2010). Scientific communicators can take advantage of this trait through the adoption of specific styles of writing, utilization of appropriate media outlets, storytelling, education reform, and improved interaction with the general public.

**Objectivity and Subjectivity**

To convince an observer of a pseudoscientific claim, promoters use certain tactics to persuade the audience. Similarly, scientific communication needs to rely on, at some level, similar types of persuasion. Views for and against the use of persuasion in scientific argumentation have deep roots. Aristotle believed that rhetoric was restricted to the arts, to things of persuasive nature that have more than one possible interpretation or outcome (Miller 2004a:18). His views can be seen as positivist in nature. A positivist approach to scientific communication argues that our only basis for knowledge is found in sensory data and, thus, the only successful means of communication is through statements that can be empirically verified (Miller 2004a:17). In other words, rhetoric is completely unnecessary and only bogs down the objective “truths” found in science. Miller suggests a “consensualist” approach where “certainty is found not in isolated observation of nature or in logical procedure but in the widest agreement with other people” (2004a:21). Alan Gross, a professor of rhetoric and communication studies at the University of Minnesota, also suggests a less positivist approach to scientific rhetoric: “since all truth is intersubjective, science, like all persuasive discourse, must convince us of the truth of its claims” (1990:21). He rejects Aristotle’s view that science is not a product of persuasion but of independent facts. I argue that both approaches contain useful elements: perhaps not all truths are
intersubjective but instead rely, to some degree, on objective data. Additionally, rhetoric need not be limited to realms outside observable truth. Knowledge and certainty can be obtained through logical deduction of sensory data, but persuasion and induction are necessary tools of scientific communication as well. Scientific communication, then, requires objectivity and subjectivity. It requires a set of objective scientific truths communicated through subjective rhetorical methods.

Total positivism may not provide a complete approach to science and scientific communication, but it would be irresponsible to disregard its underlying principle that we can obtain information through observation and sensory data. Feder (2014:25) notes that objective truth is necessary in the sciences because otherwise, we would know nothing because there would be nothing to know. Feder also provides four underlying principles of science: (1) “there is a real and knowable universe,” (2) “the universe…operates according to certain understandable rules or laws,” (3) “these laws are immutable,” and (4) “these laws can be discerned, studies, and understood by people through careful observation, experimentation, and research” (2014:25). These rules are why the syllogism model and deduction work. The syllogistic model presented in my thesis is a deductive tool whose purpose is to deconstruct pseudoscientific claims. Keith Gibson, English professor at Utah State University communicates Aristotle’s claim that “every deduction takes place via syllogism” (2008:205). Without acknowledgement of objective truths, assessment would be futile because nothing could be falsified. This does not mean we can disregard subjectivity. As Randy Olson (2009:132) observes, science needs discipline and creativity. In addition to the objective truths gained through deduction, science requires induction and creativity to progress.

Induction can be seen as more risky than deduction in that it involves taking a step outside the facts or proceeding beyond what is currently proven to be true. This step, however, is necessary for scientific innovation and proper communication. Eastern Michigan University professor Ann Blakeslee’s 2001 book Interacting with Audience relays many academics’ proposals that support the idea that scientific discourse relies on persuasion. Aristotle explained that effective persuasion could be achieved by using examples (Gibson 2008:202). One induction technique that uses examples as a form of persuasion is analogy. Gibson builds off traditional definitions of analogy to conclude that analogy is “the name for
comparing specific characteristics of otherwise distinct conceptualizations in service of a further comparison” (2008:206). Through use of analogy, scientific communicators have the opportunity to better communicate science to the general public through well-established and generally accepted concepts.

Some argue that analogy is vital to theory formation and scientific progress in general. The vitality can be debated, but the general usefulness of analogy cannot; analogy in scientific communication is helpful at least, and essential at most. Many professional and academic scientific writers, like University of Wisconsin professor Deborah Blum, list the use of analogies among their suggestions for successful scientific communication (Blum 2006:27). Like most tools, the application of analogy can affect its usefulness. Poor analogies can misdirect an experiment or inaccurately communicate an otherwise sound principle. But when employed correctly, analogy can spur induction and aid communication. This success can be observed in J.J. Thompson’s discovery of the electron and its semblance to plum pudding (Gibson 2008:203), in Erwin Schrödinger’s comparison between genetic material and the concept of coding (Gross 1990:28), and in Copernicus’s heliocentric theory based on Hermetic sun worship (Jennings 2011:53). For a more relevant example, I turn to Alan Turing’s (1950) “Imitation Game,” or what is now commonly referred to as the “Turing Test.”

When artificial intelligence, and computer programming in general, was in its infancy, British mathematician and computer scientist Alan Turing conceived of a test that would presumably allow one to determine a machine’s intelligence. As an analogy, Turing (1950:433) presented a game in which an interrogator tries to determine the sex of participants A and B, who are in another room. The interrogator does this by asking a series of questions to which the participants respond via typewritten communication. One player tries to trick the interrogator, while the other attempts to assist him or her. Turing suggests that a machine can act intelligently, or “think” once an interrogator fails to differentiate it from a human through the imitation game. Turing uses analogy by comparing one’s ability to imitate another human characteristic to a computer’s ability to do the same. Gibson notes, “Turing’s argument worked—the majority of the AI community now accepts the Turing Test (or something like it) as the yardstick for machine intelligence” (2008:209).
Not only can analogy further scientific endeavors and help communicate abstract ideas like machine intelligence, it can help disarm pseudoscience. When scientific knowledge is communicated in an audience-friendly manner, such as through relatable analogy, we have a better chance of combating pseudoscience because the real, scientific answer will stand next to the pseudoscientific one, instead of buried beneath unattractive scientific jargon.

Use of the syllogism model as a deductive tool can help deconstruct pseudoscientific claims to reveal their scientific inaccuracies. But to do so, we need to agree that certain objective truths exist and can be obtained. Additionally, inductive techniques, like the use of analogy, aid scientific invention and communication because of their persuasive nature and relation to real life. I posit another analogical-type tactic to better scientific communication: the use of fiction, specifically science fiction, to inspire and teach real science.

**Science Fiction**

Sharon MacDonald observes that scientific communicators are not merely translators or transporters of scientific information, but rather “authors of science for the public” (1996:152). Given this, scientists should consider adopting a storytelling approach to scientific communication. Ruth Levy Guyer of Johns Hopkins University’s Master of Arts in Writing Program states, “science is a process rather than a product, and this is why it lends itself to storytelling” (2006:30). What better way to communicate science than through a narrative structure, and what better genre to pick than science fiction? Suggesting that the science fiction genre can help improve science factual communication may seem contradictory, but adapting a fictional story model to fit scientific communications allows scientists to tap into the benefits that fiction provides its readers.

In *Why We Read Fiction*, University of Kentucky professor Lisa Zunshine proposes, “fiction helps us to pattern in newly nuanced ways our emotions and perceptions; it bestows ‘new knowledge or increased understanding’ and gives ‘the chance for a sharpened ethical sense’; and it creates new forms of meaning for our everyday existence” (2006:Conclusion). Fictional narratives ensure that readers engage at a deeper level than when reading nonfiction because they can connect to a character at a personal level and consider that character’s points of view. Scientific studies support Zunshine’s theory. Carr (2010) recounts a study published in the Journal of Psychological Science wherein brain scans revealed what goes on
in people’s heads as they read fiction. The study found that people “mentally stimulate each new situation encountered in a narrative” and integrate it with personal knowledge. Because of this phenomenon, science fiction provides a unique way to present scientific information that reaches audiences at an emotional level.

Marshal McLuhan recognized the science fiction medium’s power to communicate ideas when he wrote, “science-fiction writing today presents situations that enable us to perceive the potential of new technologies” (McLuhan et al. 1967:124). Science fiction can encourage one to consider past, present, and future scientific topics through successful storytelling techniques and character development. Even if the content is condensed, as long as known facts are not rejected, science fiction has the power to communicate scientific information to a more general audience. Science fiction author Orson Scott Card comments, “[we] read these stories that we know are not 'true' because we're hungry for another kind of truth: The mythic truth about human nature in general, the particular truth about those life-communities that define our own identity, and the most specific truth of all: our own self-story” (1991:xxiv-xxv). The genre engages readers with hyper-real situations through which a truer depiction of our world can exist. Its authors give readers the type of truth they yearn for, a type of truth only found in science fiction, a truth somewhat truer than what is found in our own everyday lives. The storytelling process can also help improve the image of the scientist by giving him or her a more relatable personality. Science fiction also may depict gender neutrality better than other fiction genres: “the genre with the most depictions of women scientists is science fiction, representing nearly 50% of the total” (Flicker 2003:310). In these ways, science fiction has the power to encourage scientific interest and improve communication of scientific ideas between scientists and the general public.

An argument can be made that since science fiction is, in fact, fictional, the audience may not take the concepts as seriously. Multiple studies have found just the opposite. In a study conducted by University of North Carolina at Chapel Hill social psychologist Melanie C. Green and colleagues regarding fiction labeling versus fact labeling and audience reception, they found that overall “there was no evidence that information labeled as fact had any more persuasive power than information labeled as fiction” (2006:281). The authors further support their finding by summing up Strange and Leung’s 1999 research, which showed “narratives labeled as news (nonfiction) or as fiction had equivalent influence on
readers’ perceptions of a social problem” (Green et al. 2006:268). Storytelling then can only help scientific communication in that it captures attention and sustains interest, yet still has the ability to persuade readers of its scientific content. The previous studies can be problematic, however, when one considers how readily any type of fiction (including pseudoscience) is accepted as truth. This phenomenon may not change, which is why it is critically important for scientists to take advantage of the impact fictional storytelling has over the public.

The science fiction genre provides a platform for innovation that caters to new ideas, speculative science, and predictions of social implications. This fantastical part of science fiction should not be suppressed. As discussed throughout my thesis, subjection and objection are both important to scientific discovery and communication. The powers of fiction can be harnessed through storytelling in academia. At conferences, in the classroom, in everyday conversation, and especially in writing, fictional storytelling techniques, like those employed by the science fiction medium, will ensure that scientific messages are well received by the public.

**Media Tactics**

Proper storytelling requires multi-media mastery. We tell stories differently on television than we do online or over the phone. With today’s ever changing mediums, scientists and scientific communicators need to take advantage of every media outlet available.

As mentioned in Chapter 8 of my theses, our need for immediacy does not cater well to the scientific discipline. Fortunately, Stephen White, former Head of Communications for the British Psychological Society, has a solution. White (2011) suggests that we need to make science “news” by adding implication or application and bring science to everyday life. He encourages scientists to take advantage of popular news stories and use them as an opportunity to promote related science. White reminds us, “we all have to take a level of responsibility in proactively and opportunistically engaging with the media on the stories of the day” (2011:154). We can use the need for immediate up-to-date information (evident in frequent updates on social sites like Facebook or Twitter) to provide relevant scientific facts. For example, we can harness the popularity of the Superbowl to present scientific findings on
the long-term result of concussions and suggest new technologies to combat this common football injury. Tying social happenings to scientific discoveries (new and old) helps communicate the importance and significance of the respective developments.

The mediums that give rise to, and result from, our immediate need for updated information can help scientific communication by providing a means for communication to a massive audience. Social media sites like Facebook and Twitter, along with video hosting sites and blogs, all contribute to wider scientific recognition. As a specific example, a Facebook page called “I Fucking Love Science” has over 10 million “likes.” Its child-friendly companion site “Science is Awesome” has over 640 thousand and its Twitter page has over 55 thousand followers. Through cartoons, pictures, stories of recent discoveries, and humor the page achieves it goal to “bring the amazing world of science straight to your newsfeed in an amusing and accessible way” (I Fucking Love Science’s Facebook Page n.d.). Other examples of scientific success in mainstream media include the Nobel Prize website’s “Ask a Nobel Laureate” project, which gave audiences the opportunity to directly interact with esteemed scientists (Birch 2011:285), and the Naked Scientists radio show and accompanying podcast which reaches 6 million listeners across east England as well as international audiences (Naked Scientists n.d). Social media provides a low-cost/high-volume ratio that ensures the communicators reach the largest audience at the lowest cost. It also drastically increases the storage and retrieval capacity that Goody (2000) acknowledged as a tool for intellectual technology.

The Internet has the potential to decrease effective scientific communication as well. Mooney and Kirshenbaum (2009:114) observe that blogging has the potential to encourage those with similar viewpoints to group together and rant amongst themselves. As science communicator Hayley Birch classifies it, those groups are simply “preaching to the converted” (2011:289), a tactic that has the potential to degrade the public understanding of science. All too often I see people posting articles or links to blogs on social media sites that consist of rants from a scientific community. Often, these articles directly attack the “public” for not understanding or not having an interest in science. Articles and blog posts like this are not only unhelpful but actively harmful. Perpetuating negative writings that call those outside the scientific community stupid or useless is not likely to encourage someone to investigate an issue and further alienates scientists from the a potentially interested public. This situation
has a simple answer: do not take part in perpetuating negative scientific postings. Doing so reflects badly upon the scientific community and is irresponsible. Unfortunately, the very immediacy that we crave from the Internet can produce poor decision-making habits since we tend to react impulsively to online information. Mooney and Kirshenbaum observe that blogging favors “polemicism over nuance” (2009:113), which leads to impulsive writing rather than deep-thought. This obsession with immediacy breeds inaccuracy and lacks self-reflection. Wynne states, “reflective recognition of its own conditionality is a pre-requisite for science’s greater public legitimation and uptake” (1996:39). To fix the dilemma online communication presents, we need to address another: improving interaction between scientists and the general public.

**Public Interaction and Education Reform**

Blakeslee’s study of physicists’ interaction with audiences showed that “distant guesses about audience based on assumptions about uniformity or broad-stroke characterizations aimed at manipulation and domination rather than cooperative interaction don’t work well” (2001:29). Fortunately, Blakeslee’s study also revealed that cooperation and intimate interaction with audiences yields stronger, more effective arguments from authors. To better achieve this end, she suggests using a model that considers what has worked in the past and what is likely to work given current circumstances. This means considering a more subjective approach to scientific communication that takes into account context and requires audience interaction. But how do we go about interacting? Biochemical geneticist David Bennett (2011) suggests scientists can build relations with the general public a number of ways. Among these ways: hosting science festivals, visiting local schools, talking at business conferences, women’s groups, or special interest talks, engaging in social media, and interacting with policy makers. We have already discussed methods for engaging through social media, and talking at conferences is nothing new for seasoned scientists. Glassner (1999:210) offers a political solution, arguing we should choose to elect candidates that offer programs not problems. Interaction with schools warrants further exploration.

One of the more obvious and vocalized solutions to scientific illiteracy is to change or improve our education system. This generalized statement is problematic for two reasons: first, it assumes a degree of illiteracy that might not exist. In previous chapters I discussed the
misconception that the general public is largely ignorant of science or unwilling to learn. Second, the proposed solution assumes that filling the perceived void with vast amounts of facts will increase scientific literacy. We have seen how this too is not completely accurate; facts exist but do not necessarily speak for themselves. If we assume the position that the general public is capable of learning and that we can successfully communicate scientific fact, then we can propose appropriate solutions. I suggest the answer lies in an interdisciplinary approach to science at all levels of education.

While Aristotle distinguished art from science, I believe the disciplines are not as different as one might assume. Kuhn wrote, “the most rigid of all disciplines…could also be the most creative of novelty” (Preston 2008:7). Art, like fiction, has the power to inspire scientific innovations and interaction. Science museums are perfect examples; they provide appealing, interactive exhibits. Likewise, science can inspire art and is an integral part of an artistic process: finding the right shade of paint involves chemistry, drawings require geometry, and you cannot build sculptures without considering physics. Since science is engrained in everyday life, its presence in the classroom should be as well. This means that art needs to be integrated into the sciences. We cannot expect the public to be excited about science when scientists refuse to engage in disciplines that they might see as unscientific or “soft.”

Mooney and Kirshenbaum (2009:118) suggest that we do not merely need more scientists, but more well-rounded ones who understand other disciplines. van der Sanden and Osseweijer’s second paradigm shift reminds us that this effort needs to exist at the organizational level with professors and their universities working together. To achieve this, Miller (2004a) argues for a more humanistic approach to technical writing and scientific rhetoric in university curricula. This approach would place technical and scientific writing within the humanities and encourage self-examination as well as the more subjective approaches mentioned in this chapter. Miller states, “we can teach technical or scientific writing, not as a set of techniques…but as an understanding of how to belong to a community” (2004a:22). To form this community we need to encourage the next generation of scientists to engage with policy makers, religious leaders, teachers and academics in other disciplines, entertainers, and anyone one who is affected by science.
The Choice is Ours

Changing people’s opinions on pseudoscientific claims may seem hard. It is. In some cases it is impossible. But we should not focus on changing what people think, but rather on how they come to a specific conclusion. Attempting to change what people think is what charlatans and cult leaders do. Changing how we think is a job for a scientist. David Foster Wallace said, “learning how to think really means learning how to exercise some control over how and what you think. It means being conscious and aware enough to choose what you pay attention to and to choose how you construct meaning from experience” (Carr 2010:194-195). Carl Sagan concurs, “science is more than a body of knowledge, it is a way of thinking” (1996:25). Deciding to pursue science instead of pseudoscience, choosing to take the time to deconstruct a claim, or simply approaching a situation with a bit of skepticism can change what conclusion one makes. To encourage an acceptable level of control over personal thought, we can turn to scientific communication. Productive scientific communication need not be blunt and blaming. In fact, that approach is likely to fail. It is not affective to throw scientific knowledge at people and expect it to stick. Unfortunately, this is exactly how pseudoscience operates and succeeds. Some people, for reasons we have explored in the previous chapters, choose to be skeptical of science. That’s okay, skepticism is a positive analytical tool. But at the same time, this skepticism is rarely directed toward pseudoscience. To change this, science needs to be communicated in a new, more encompassing way. Through rhetorical techniques like syllogism, analogy, and storytelling, scientists can relate situation to everyday life. Likewise, properly interjecting science into different media venues increases its positive visibility. Interdisciplinary approaches to science in schools and universities can also help increase science’s presence. Finally, both the scientific community and the general public need to make concentrated efforts to work together.
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