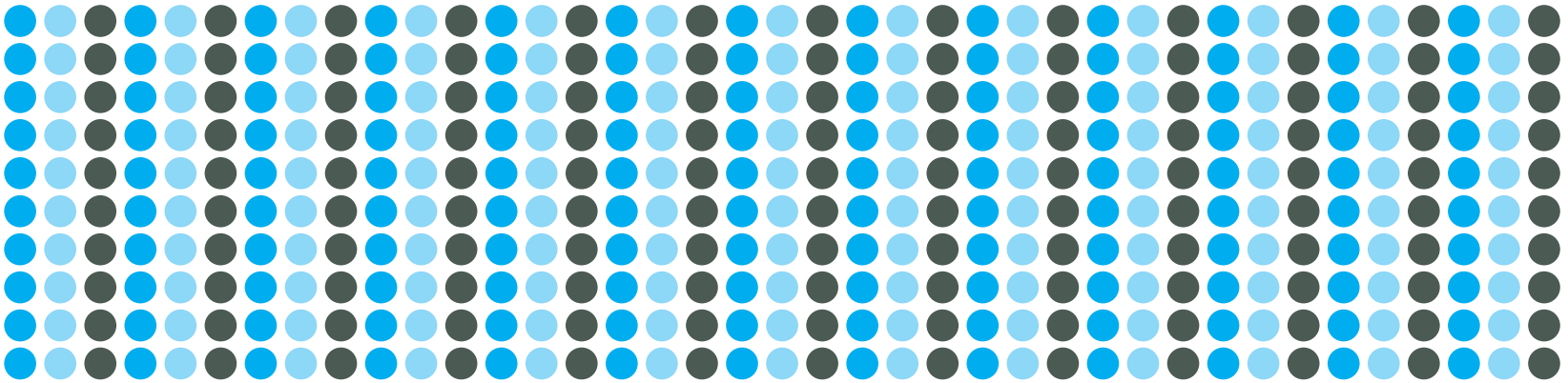
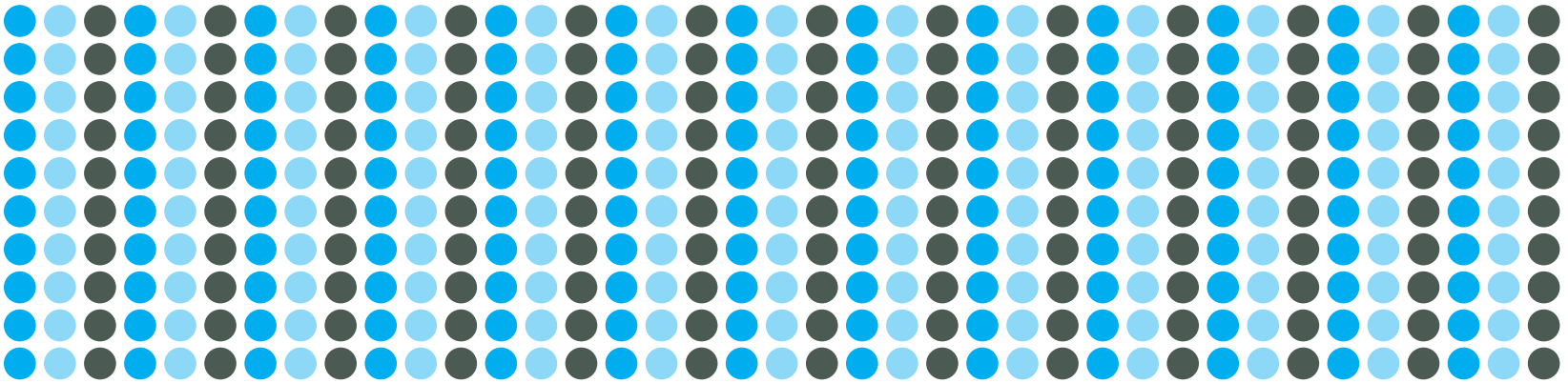


MISSION STATEMENT

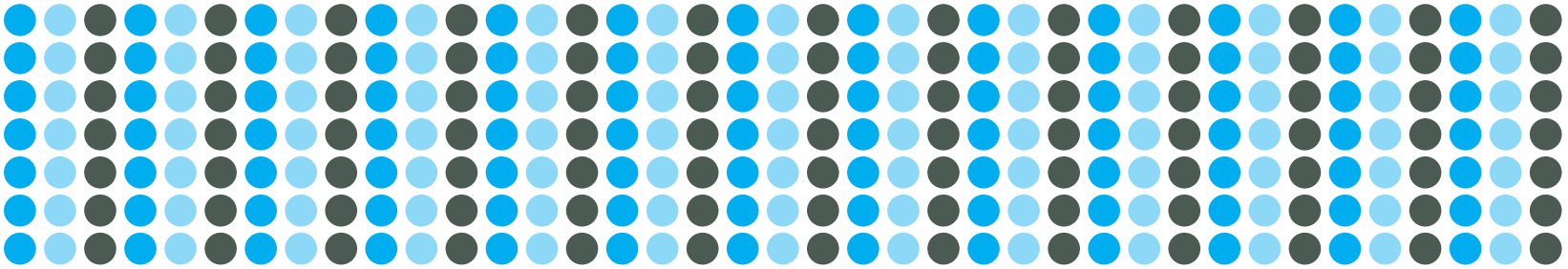
Elements, the undergraduate research journal of Boston College, showcases the varied research endeavors of fellow undergraduates to the greater academic community. By fostering intellectual curiosity and discussion, the journal strengthens and affirms the community of undergraduate students at Boston College.

Elements

Fall 2012



Volume 8 : : Issue 2



THANKS

We would like to thank Boston College, the Institute for the Liberal Arts, and the Office of the Dean for the College of Arts and Sciences for the financial support that makes this issue possible.

QUESTIONS & CONTRIBUTIONS

If you have any questions, please contact the journal at elements@bc.edu. The next deadline is Tuesday, November, 20, 2012. All submissions can be sent to elements.submissions@gmail.com. Visit our website at www.bc.edu/elements for updates and further information.

COVER

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PERIODICITY

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ELEMENTS STAFF

EDITOR'S NOTE

This issue is a wonderful combination of subjects. Looking at the three cover articles one can see the diversity of subject matter that has come to be the standard for Elements. The cover image is an artistic rendering of the Earth's magnetic field as a protective force. The cover story, Quake by Nicholas Martis, uses personally gathered data to investigate the possibility of using magnetism to predict the location and magnitude of earthquakes. Each year we hear of earthquakes that lead to the destruction of much property and the loss of many lives. The Indonesia Tsunami of 2004 comes to mind as a time when better prediction capabilities could have saved countless lives. An earthquake of lesser destruction, but more recent press, is the L'Aquila earthquake. The lawsuit that followed led 7 men to be imprisoned for the results of an earthquake. These men tried to predict an earthquake after the city of L'Aquila experienced tremors. Better techniques of earthquake prediction not only have spared these men their freedom, but also could potentially have saved some or all of the 300 lives that were lost in this disaster.

Lines in the Sand by Corey Streitweiser, our second cover article, explores the schools of Plato and, the lesser known, Isocrates to look at the formation of the philosophical Identity of the Ancient Greeks. The Ancient Greeks are the scholarly foundation of much of Theology (Thomism) and Philosophy. The importance of research on lesser known figures cannot be overstated for its capacity to further enrich our understanding of philosophy and Corey's work epitomizes that fact.

The third cover article is a celebration of sorts. In this, the 150th anniversary of Boston College, it is only fitting that we have a article exploring a portion of our University's faith tradition. Jesuits and Sorcery is an article that explores the work of the Society of Jesus in New France. This article calls on a primary source: the diary of Fr. Paul Paul Le Jeune the superior of the Jesuits in Quebec, to describe the actions of the Order. This article calls attention to less known aspects of the Society of Jesus and hopefully will foment some discussion about the role of the order in the past and today.

This is a unique time for Elements, it is the first time that a Junior has become Editor-in-Chief, and it is a trend that will be continued at least once more with the welcoming of our new Managing Editor Emily Simon, a Sophomore. Elements celebrates perhaps its youngest ever staff right now, and together the desire is to use that energy and youth to work toward the goal of further disseminating the wonderful undergraduate research that occurs on our campus. It is with my utmost pleasure that I present to you this the second issue of Volume 8 of Elements.

Sincerely,

NICHOLAS C. COCHRAN-CAGGIANO

Editor-in-chief

CONTENTS

Perspectives

PIEZOCHROMISM AND EARTHQUAKES

by Corleone Delaveris

Certain crystalline solids change behavior and or composition under the stress of increased pressure. One such characteristic is piezochromism: the tendency for a material to change color under pressure. The piezoelectric effect then is the tendency for a material, such as quartz, to generate an electromagnetic field when under stress. The piezoelectric effect has been extrapolated to suggest a method of predicting earthquakes, as researched in Martis' article. The pressure and tension in the Earth before the release of an earthquake, as well as the pressure from the compressive seismic p-waves released during the earthquake, would induce stress on any piezoelectric material, resultantly producing a magnetic field.

If such an electromagnetic field fluctuation could be detected, it would provide an unprecedented method for predicting earthquakes. Forewarning of an earthquake would provide extremely valuable time to evacuate and shut down crucial mechanical systems to avoid both human loss and industrial disaster. Such a system would have the possibility of being employed in high-risk zones across the world to warn against earthquakes, such as the Great 1906 San Francisco Earthquake, which resulted in the loss of thousands of lives and set fire to San Francisco, or the more recent 2011 Fukushima Earthquake and resultant meltdown of the Fukushima Daiichi nuclear reactor. The ability to predict such devastating earthquakes could avoid immense loss and destruction in both highly developed, such as Japan and California, and impoverished nations, such as Haiti, which recently experienced a disastrous earthquake in 2010. Therefore, the development and employment of such a system, as researched by Martis, would be an invaluable asset if developed.

1. "Piezochromism." <http://students.chem.tue.nl/ifp07/texts/piezochromism.htm>.
2. Piezoelectric Effect." <http://hyperphysics.phy-astr.gsu.edu/hbase/solids/piezo.html>.
3. "Earthquake Glossary: P Wave." <http://earthquake.usgs.gov/learn/glossary/?term=P%20wave>.
4. "The Great 1906 San Francisco Earthquake." <http://earthquake.usgs.gov/regional/nca/1906/18april/index.php>.

THE POWER OF DREAM

by Kimberly Ayala

There have been several hypotheses made about the roots of dreaming throughout history. Freud believed that they were manifestations of our inner frustrations, stemming from what he called the *id*.[1] Others believe it has more to do with random neuronal firing that takes place while asleep. Further explanations exist, but, regardless of which hypothesis is correct, one thing remains true: the process of dreaming must have had some sort of adaptive effect somewhere along in our biological history. This benefit is most likely that dreaming is involved in the formation of memory and solidifies the neuronal connections, which leads to learning as well. One other explanation is that dreaming prepares us for potential threatening situations we might encounter. The dreaming process uses a lot of the same brain structures as are used during such situations.[2] These include the parts of the limbic system, which include the amygdala, the hippocampus, and the hypothalamus. For these reasons and reasons like them, studying and learning more about the dreaming process and what causes it is an advantageous endeavor.

1. http://www.dreammoods.com/dreaminformation/dreamtheory/freud.htm
2. Gazzaniga, Michael S. Psychological Science Ise 4e. [S.l.]: Ww Norton &, 2012. Print.

THE CONCEPT OF RESPONSIBILITY

by Michael Kennedy

The concept of responsibility raises two major questions. First, for what is one responsible? Second, to whom is one responsible? No matter the case, as responsibility is laid upon someone or something, it, as an ethical imperative, prescribes and validates a specific set of behaviors.

The responsibility of the state in its international relations would then imply a proper set of behaviors. However, it is not always clear what the state is responsible for or to whom the state is responsible. The dominant perspectives used to analyze state relations explain state behavior in various ways, leading to different conclusions for responsibility.

For example, realism concentrates on survival, hierarchy, and balances of power. The state would be obligated to maximize its power and to preserve itself, while it would be responsible to itself and its citizens.

Liberalism, meanwhile, focuses on the role of international institutions and economic interdependence. Therefore a state would be responsible for its participation in the international economic and governing system. Accordingly, a state would be responsible to an international organization or, and to the world economy.

Alternatively, constructivism attends to the creation and international distribution of norms and values, and for acting in accordance with these standards. And the state would be responsible either to these values or to the transnational communities that create them.

However, these analytical perspectives do not supply a complete understanding of responsibility. The perspectives are primarily meant to explain state behavior; not to prescribe it. That is, when looking back and examining state behavior it is much more obvious why a state acted or failed to act. We can ascribe and infer responsibilities based on our explanations. However, in the present, responsibility becomes much more difficult to ascribe: what is a state's responsibility when there are no obvious implications for the balance of power? When the international system turns a blind eye? Or how does a state choose between two equally valid sets of values provided by different transnational communities?

Even in cases where the different analytical perspectives bear out answers, it is not always clear which perspectives offer the most complete concepts of responsibility. For example, who is more responsible to the United Nations, the United States or Tuvalu? The United States is less dependent on the United Nations, but as a member of the Security Council, it is also an important leader. Or consider the nuclear arms buildup of the Cold War. Were the United States or United Soviet Socialist Republic ever responsible for the potential side effects of their conflict on the rest of the international system? Should the United States and the United Soviet Socialist Republic have had a responsibility to the world that superseded their own survival?

Therefore, when we consider the responsibility of the state in its international relations, we should draw upon the different analytical traditions to inform our beliefs. However, we must also be aware that the traditions offer a limited prescription for behavior and do not necessarily elucidate the progressive obligations of the state in international relations.

RHETORIC AND PRACTICALITY IN PLATONIC PHILOSOPHY

by Lucia Kim

Although many today consider Socrates the paragon of philosophy, he was not without his critics. Aristophanes, in his famous comedy, *The Clouds*, ridicules Socrates for engaging in pointless philosophical endeavors. Socrates was also accused of being a sophist, using rhetoric to deceive the youth and make weaker arguments appear stronger. Against this criticism, the ancient philosophers such as Socrates sought to distance themselves from the pretentious sophists who made long, complicated arguments to entice the masses.

Socrates, in the account given to us by Plato, is presented as a staunch opponent of the sophists, as seen in Platonic dialogues such as *Protagoras* and *Gorgias*. Nonetheless, Socrates did not condemn rhetoric as a whole. Socrates saw rhetoric as a means to an end, and stressed the importance of distinguishing between rhetoric used for good and rhetoric for the sake of selfish aims. The sophists, on the other hand, were more concerned in winning arguments rather than seeking the truth. In *Phaedrus*, Socrates discusses the art of "true rhetoric," claiming that "It's not speaking or writing well that's shameful; what's really shameful is to engage in either of them shamefully or badly."[1] Socrates then argues that understanding of the good is necessary and fundamental for good rhetoric.

This leads us back to what is eternal and unchanging – the Forms. In pursuit of the immaterial Forms, Plato suggests a method of abstract, logical thinking. While this theoretical approach may sound impractical to some – the pursuit of truth and meaning does not affect the skill of a rhetorician or politician – Plato's discourse provides a valuable sense of direction. Only when the ultimate end is made clear is it possible for the art of speechmaking to serve its purpose. The search for truth and meaning is crucial in ordering one's soul; and while Plato admits his ideal city of The Republic is imaginary, there is still hope that it might be possible to pursue the Forms and live a fulfilling, philosophical life. Plato's philosophy is practical in that it provides an end, the search for meaning and how to live a good life.

1. *Phaedrus*, 258d4-5

THE IMPORTANCE OF ART

by Saljooq Asif

In contemporary society, art is often ridiculed and laughed at as nonsense. The pomposity of art critics is constantly derided and mocked, and art itself has consequently lost its respect and value. It cannot be denied, however, that some people recognize art as one of the most complex and sophisticated areas of creativity. Of course, one also has to wonder at least once in one's life about the nature of emotional response to art, and that is exactly what Paul Boboc's article discusses and analyzes. Could the perception of art be governed by neurobiology, dictated by the mechanical workings of science? Or could admiration of art instead be influenced by personality, which is in turn shaped by upbringing, experiences, and culture? There are several dissenting opinions and no widely accepted theory. Be it based on science or one's individuality, art remains powerful. A work of art can evoke emotions worldwide and may have many different interpretations and understandings. Although Boboc's paper focuses specifically on illustrated art, one cannot help but wonder about these conjectures and their implications on other forms of art, such as music, literature, and film. Every day we are exposed to art, and every day we experience certain emotions. Yet we still do not know exactly why we perceive art the way we do. This insightful article not only questions and analyzes contrasting theories, but helps elucidate a deceptively complex matter.

PROBLEMS WITH DIAGNOSIS

by Ali McDonald

Adolescence can be an overwhelming and confusing time for both youth and their parents. The average teenager is confronted with new hormones, strange emotions, and difficult relationships. However, these challenges are exacerbated for the 7 to 12 million American adolescents suffering from mental, behavioral, or developmental disorders. These children, due to a combination of factors including brain chemistry, genetics, and environmental stress or stimuli, may exhibit physical or verbal aggression, destructive action, or habitual lying, which affect their personal and communal relationships. While therapy and medication can help manage these disorders, it can be difficult for psychiatrists to accurately diagnose children; many of these symptoms correspond with normal teenage behavior. Because the DSM-IV was originally written to diagnose adults, many adult behavior norms are applied to children. Furthermore, the symptoms of most behavior disorders are more abstract; unlike other medical disciplines like oncology, which can use objective tests to confirm a doctor's initial diagnosis, psychology and psychiatry are often based on subjective opinion. This means, for example, that while one psychiatrist may take over-aggression and diagnose it as a conduct disorder, another may determine that the child has ADHD. Psychology and psychiatry are constantly evolving disciplines, and new advancements in the fields will hopefully be able to more accurately diagnose and treat adolescents with mental disorders.

1. http://www.aacap.org/
2. Ibid
3. http://www.psychologytoday.com/blog/suffer-the-children/201105/six-problems-wih-psychiatric-diagnosis-children

LOOKING AT RICKERT

by Ben Martin

Sam Kent's article clearly and succinctly summarizes a number of elements central to the thought of Neo-Kantian philosopher Heinrich Rickert. While Sam ends with the claim that Rickert's work deserves more attention in the academic realm, he does not specify why. It seems he does not, in part, because this would require further space and some speculation beyond the scope of his article.

Rickert begins with "the experienced reality of everyday life."[1] This grounds his work; no matter how abstract or foreign his reflections may appear, they relate to universally accessible human experience. Furthermore, it is within this context that he approaches the problem of conceptualization. Because he begins with the one, unified realm of everyday life, he cannot assume any architectonic, metaphysical distinctions which will structure his inquiry. Instead, faced with a single, continuous field of experience, Rickert must turn to the side of the subject for guidance, and in this way he arrives at his concept of methodology, a powerful and important concept in light of the epistemic problem at hand. Kent presents methodology above in terms of a task: "to make an explicit formal criterion necessary for meaningful conceptual abstractions."

Next, the article examines two methodologies alternative to Rickert's, which, though refuted, may influence our thinking even today. Through his criticisms of Platonic realism and epistemic realism, Kent isolates the crux of the issue: one seeks neither knowledge of universals at the expense of knowing one's particular, daily lives, nor knowledge of particulars, merely in their meaningless complexity. In other words, no person lives according to universal laws unrelated to the concrete context in which he or she does in fact live, and no person lives in relation to the full complexity of empirical reality without the guidance of a more discriminating sort of conceptualization. In response to this, Rickert still identifies two corresponding methods which guide our thinking—generalization in the natural sciences and individualization in the humanities—but each only provides half of the picture

of reality. Perhaps of even greater importance, he identifies the key concept in the latter method as value. Thus, the humanities study, and people often concern themselves with, those particularities endowed with value.

Finally, while Rickert ultimately does not succeed in constructing an ontological-independent epistemology nor a satisfying philosophical demarcation of the sciences, his work does provide a wealth of phenomenological insights. These include his description of reality as continuous and as infinitely extensively and intensively complex, his identification of two sorts of scientific method operative in thought, and the place of value in human interaction with the world. Moreover, by beginning from everyday experience and by attending closely to methodology, Rickert both contributes to the intellectual environment from which the phenomenological tradition will develop and offers contemporary scholarship a still valuable body of work on the very same epistemic questions which concern scholars today.

1. Zijderveld, Anton C. Rickert's Relevance: The Ontological Native and Epistomological Functions of value. Leider; Boston: Brill, 2006.

HISTORY OF THE JESUITS

by Alex Gilligan

The sixteenth century was an era of tremendous change. Still relatively fresh from the dark ages, Europe had set its eyes on the rest of the world, sending its folk west to the expansive unknown of the New World and east where the empires of the Orient flourished in their own very different wealth. European settlers saw opportunity in these lands so new to them: they found places to carve out new dominions, as in the Americas, and places to settle trade routes to gain access to highly valued goods, as in Asia.

In the middle of the sixteenth century, a traveler from Spain by the name of Ignatius founded a new religious order of Catholicism, known as the Jesuits. While most Catholic orders of many centuries past were monastic and sedentary, content with turning inward to prayer and seclusion, the Jesuits sought a different path. As they saw Europe spread outwards to the rest of the world, the Jesuits became pilgrims. They even developed new prayers quick enough to be said while traveling. As their countrymen journeyed to Asia and America, they too went forth. Their mission was to spread Catholicism to the far reaches of the Earth.

These Jesuit missionaries, arriving small in number in the newly discovered civilizations, were often welcomed with open arms, and would live among those they sought to convert. They would set up schools, such as that created by Francis Xavier in Goa, India. As a result there are a plethora of Jesuit run schools worldwide. In addition, some Jesuit missionaries earned positions of great respect among the people to whom they preached: the Jesuit Matteo Ricci became a trusted advisor in the court of the Chinese Emperor, and was the first European allowed in what is called the Forbidden City. From these positions of respect, the missionaries were then able to effectively begin their spread of Catholicism.

It was in this world and with this mission that the Jesuits spread to New France and sought to convert the Native Americans there to Christianity. They became as renowned as the shamans who spoke for the Native religion and in many cases even sought to usurp them.

QUAKE

The Correlation Between Earth's Magnetic Field Disturbances and Earthquake Activities

NICHOLAS MARTIS

IT HAS BEEN SHOWN THAT SOME CRYSTALLINE SOLIDS GENERATE ELECTROMAGNETIC (EM) SIGNALS WHEN UNDER STRESS. THIS PHENOMENON IS KNOWN AS THE PIEZOELECTRIC EFFECT. THESE EM SIGNALS CAN TRAVEL THROUGH THE GROUND AND AFFECT THE MAGNITUDE OF THE EARTH'S MAGNETIC FIELD. THEORETICALLY, THE EM SIGNALS GENERATED BY MINERALS IN LOCATIONS WHERE EARTHQUAKES WILL SOON OCCUR SHOULD PROVIDE A METHOD FOR PREDICTING EARTHQUAKES. A CORRELATION BETWEEN MAGNETIC PERTURBATION AND EARTHQUAKES WAS SOUGHT BY USING MAGNETOMETERS TO DETECT DISTURBANCES IN THE EARTH'S MAGNETIC FIELD PRIOR TO EARTHQUAKES. ANALYSIS OF FOUR YEARS OF MAGNETOMETER DATA HAS NOT YET YIELDED ANY CONCLUSIVE RESULTS. AT THIS STAGE, THE MAGNITUDES OF MAGNETIC PERTURBATIONS CANNOT BE USED TO PREDICT THE MAGNITUDE OF AN EARTHQUAKE IF ONE DOES OCCUR. HOWEVER, THERE REMAINS MUCH TO BE INVESTIGATED IN THIS AREA OF RESEARCH, ESPECIALLY IN TERMS OF FILTERING MAGNETOMETER DATA.

The direct piezoelectric effect describes the reaction that occurs when a mechanical stress is induced on a solid material, often a crystal. In crystalline structures, the atoms are arranged in a very specific configuration, meaning that any charged particles within the structure will generate a predictable electric field.[1] The deformation of the solid caused by an applied force generates an electric potential difference across it by changing the strength and/or direction of the electric dipoles within the bulk. When significant stresses are applied to these solids, the change in electric conditions can be readily measured.

Earthquakes are preceded by the gradual accumulation of large shearing forces which place a significant stress on the crust in the area of the impending quake. When the stress reaches a critical point, the crust sharply returns to a stable condition in much the same way that a stretched rubber band will snap back to its original shape. This deformation, or stretching, of the Earth's crust creates a condition in which certain minerals are expected to demonstrate the piezoelectric effect. Furthermore, an earthquake is transmitted by a pressure wave, in which the mechanical stress propagates radially through the crust from the epicenter, the point of origin of the quake. These waves have the potential to create a time-varying electric field through the piezoelectric effect.[2]

A change in the strength or direction of an electric field creates a magnetic field by the relation famously shown by James Clerk Maxwell. The Earth's magnetic field has a known strength of about $4x10^4$ nanoTesla (nT) (though it varies with latitude) and behaves in a fairly predictable way. The field strength gently increases throughout the day and returns to a lower strength as night approaches, usually not changing by more than a few dozen nT at latitudes away from the poles. External disturbances, such as geomagnetic storms that occur when strong solar wind strikes the atmosphere, can produce similar perturbations, resulting in spikes in the magnetic field strength. An instrument called a magnetometer can detect these variations. Magnetometer stations have been set up around the globe in order to monitor the behavior of the Earth's magnetic field at different latitudes and longitudes.

The stress buildup in the Earth's crust and the resulting pressure wave, which transmits an earthquake, can place enough stress on crystalline minerals to produce changing electric fields that in turn create a disturbance in the Earth's magnetic field.[3] In addition, other electric earthquake precursors have been shown to occur in nonpiezoelectric rocks.[4] Particularly, a phenomenon called the motion of charged edge dislocations occurs whenever a crack opens in brittle rock and propagates to the surface of the Earth. This effect has been shown to generate a pressure-stimulated current that increases linearly with stress rate when the material is elastically deformed. The same process of fracturing occurs on a much larger scale near the end phase of the buildup of an earthquake. The cracking creates tremendous electric currents in the ground, which travel to the surface and into the air.

The earthquake-generated electric field can alter the magnetic field surrounding the earthquake zone, and these electromagnetic effects can easily be detected by a magnetometer on the surface of the Earth. The practice of using various electromagnetic detectors, including ground-based magnetometers, to analyze earthquakes has been ongoing for some time. For example:

> Researchers in Taiwan monitored 144 earthquakes between 1997 and 1999, and they found that for those registering 6.0 and higher [on the Richter magnitude scale] the electron content of the ionosphere changed significantly one to six days before the earthquakes.[5]

They claimed that such ionospheric disturbances happen when crystalline rocks are deformed by the slow grinding of the earth that occurs just before an earthquake occurs. However, a clear method of generation of these signals has yet to be established. If the results are indeed to be correlated with earthquakes, then research must be carried out to try to discover the specific relationship.

Analysis of the Earth's magnetic field during the time preceding an earthquake may therefore uncover a method of prediction. So far, seismologists have been unable to predict earthquakes with a satisfactory level of precision. Predictions are usually unable to be any more specific than a

range of several decades, meaning that few measures can be taken for human safety.[6] A more precise method of prediction could allow for a great reduction in damage caused by earthquakes since areas at risk could be evacuated or prepared.

Moreover, the characteristics of the magnetic disturbances may provide additional insight into the severity of the earthquake. More significant deformation of the Earth's crust should theoretically lead to larger magnetic field perturbations. Additionally, the strength of a magnetic signal may relate to its distance from an earthquake epicenter. These two measurements may therefore lead to a method of predicting not only earthquake occurrence, but intensity as well. Any correlation between the onset time of a magnetic disturbance relative to an earthquake will also be investigated.

METHOD

Earthquakes which occured in the years 2006, 2007, 2010, and 2011 were investigated. For each year, a list of earthquakes with magnitudes greater than a certain level on the Richter scale (either six and a half or seven depending on the year) was obtained from the SeismiQuery database. About fifteen earthquakes for each year met this criterion. The time, epicenter location, and magnitude of each earthquake were recorded.

Information regarding the Earth's magnetic field was obtained from magnetometer stations belonging to the INTERMAGNET network of observatories. The strength of magnetic field perturbations was obtained from magnetometer stations closest to the epicenters of the above earthquakes. Data from about ten magnetometer stations with distances to epicenters ranging from zero to about eight thousand kilometers were used for each earthquake. Magnetometer readings of perturbations occurring up to five days prior to the seismic event, as well as those that occurred simultaneously, were investigated. Any drastic changes in the earth's magnetic field, of delta H (from trough to crust of the magnetic field deflection) greater than about 10nT, were considered for this study. Any perturbations of greater than 50nT were determined to have arisen from unrelated sources, such as geomagnetic storms or man-made interference. The location of the magnetometer station, the size of the magnetic field perturbation, and the time of the disturbance were identified and archived for further analysis. Plots displaying these data, in reference to the data related to the information regarding the earthquakes, were created separately for each year in order to search for any correlation.

RESULTS

Figure 1 top panel shows the contour map of the Earth's magnetic field perturbation (delta-H) as a function of the distance and earthquake magnitude for the year 2006. As can be seen in the figure, there is no clear correlation between any of the three measured values. The bottom panel shows the contour maps of the relative time before the earthquake as a function of distance from the epicenter and the earthquake magnitude in Richter scale. Again, there is no clear correlation present.

Figure 2 shows data in the same configuration as in Figure 1, but for the year 2007. Neither plot displays any clear correlation between earthquake activity and perturbations in the Earth's magnetic field. The same plots for 2010 appear in Figure 3. As before, no clear correlation between any of the four measured values can be determined. The pair of plots appearing in Figure 4 displays data from 2011. There does not appear to be any obvious correlation between the measured magnetic field perturbations and earthquake activity. The plots do however present a few details worthy of note. Relatively few signals were detected, primarily when earthquake magnitude is greater than 7, more than three days before earthquakes in all of the four years observed. Additionally, few perturbations were detected in the times immediately preceding the earthquakes.

It has also been postulated by researchers such as Johnston (2007) that magnetic perturbations should occur concurrently with earthquakes. Readings from stations within a 1000km radius of any earthquake were specifically examined to investigate this prediction. Figure 5 shows a contour map of data in the same format as Figure 1 above. Earthquakes do appear to often be accompanied by sharp

drops in the strength of the earth's magnetic field near the epicenter, and, unlike many of the other perturbations recorded, the magnetic field did not quickly return to previous levels. However, this was not observed as a consistent occurrence, and again, there appears to be no regular correlation between magnetic field conditions and earthquakes.

ANALYSIS

Linear relationships between distance and magnetic perturbation magnitude, between earthquake magnitude and magnetic disturbance magnitudes, and between earthquake magnitude and the time of magnetic perturbations were expected. There appears to be no correlation between any of the four variables. Large magnetic perturbations occur both near and far from epicenters as well as mere hours to days before the earthquakes. In addition, earthquakes with higher magnitudes do not seem to be associated with larger magnetic perturbations, and any observed perturbations do not orient themselves in time in any discernable pattern. The lack of correlation may suggest that the magnetic field perturbations occurring before, during, and after the earthquake may not in fact be correlated with the earthquakes at all.

One possible cause for the failure to identify a trend in magnetic perturbation magnitudes may lie in the fact that the Earth's magnetic field strength varies strongly with latitude. Subsequently, perturbations with large magnitudes were fairly common at stations near the Earth's magnetic poles and at the geomagnetic equator regions, but less common near the mid-latitude region. Stations over a wide range of latitudes were used to gather data that was correlated with each earthquake. Perhaps the percent change in magnetic field strength should be compared to earthquake data. Additionally, since the universal time of the magnetic perturbations was recorded rather than the local time, no distinction was made as to whether the disturbance occurred during the day or night, which may have significant differences in the magnitude of delta H. The increased magnetic field activity during daylight hours may have affected data by making the magnitude of delta H appear larger than it actually was. Furthermore, no distinctions were made regarding the locations of the earthquakes. It is possible that quakes occurring along different faults may emanate different types or magnitudes of signals depending on the composition of the crust in the region or the characteristics of the fault.

Also, it is acknowledged that numerous other sources can contribute to disturbances in the Earth's magnetic field. Magnetic storms as well as man-made electronics near the magnetometer sensor can cause perceptible changes that may have been falsely correlated with earthquakes. Additional investigations that rigorously filter out this background noise may be useful.

The absence of any observable relationships in these data should not, however, be taken to discredit the method, as it is only a preliminary study. The modes of generation of many of these signals have been verified experimentally on smaller scales. Application to tectonic scale may involve yet undiscovered readjustments. Moreover, the potential applications of a prediction technology for public safety cannot be ignored and should provide the impetus to further research.

ACKNOWLEDGEMENTS:

The results presented in this article rely on data collected at magnetic observatories. I thank the national institutes that support them and INTERMAGNET for promoting high standards of magnetic observatory practice (www.intermagnet.org).

Information regarding seismic events was obtained from the IRIS database (http://www.iris.edu/SeismiQuery/sq-events.htm).

Research was conducted at and funded by the Institute for Scientific Research of Boston College.

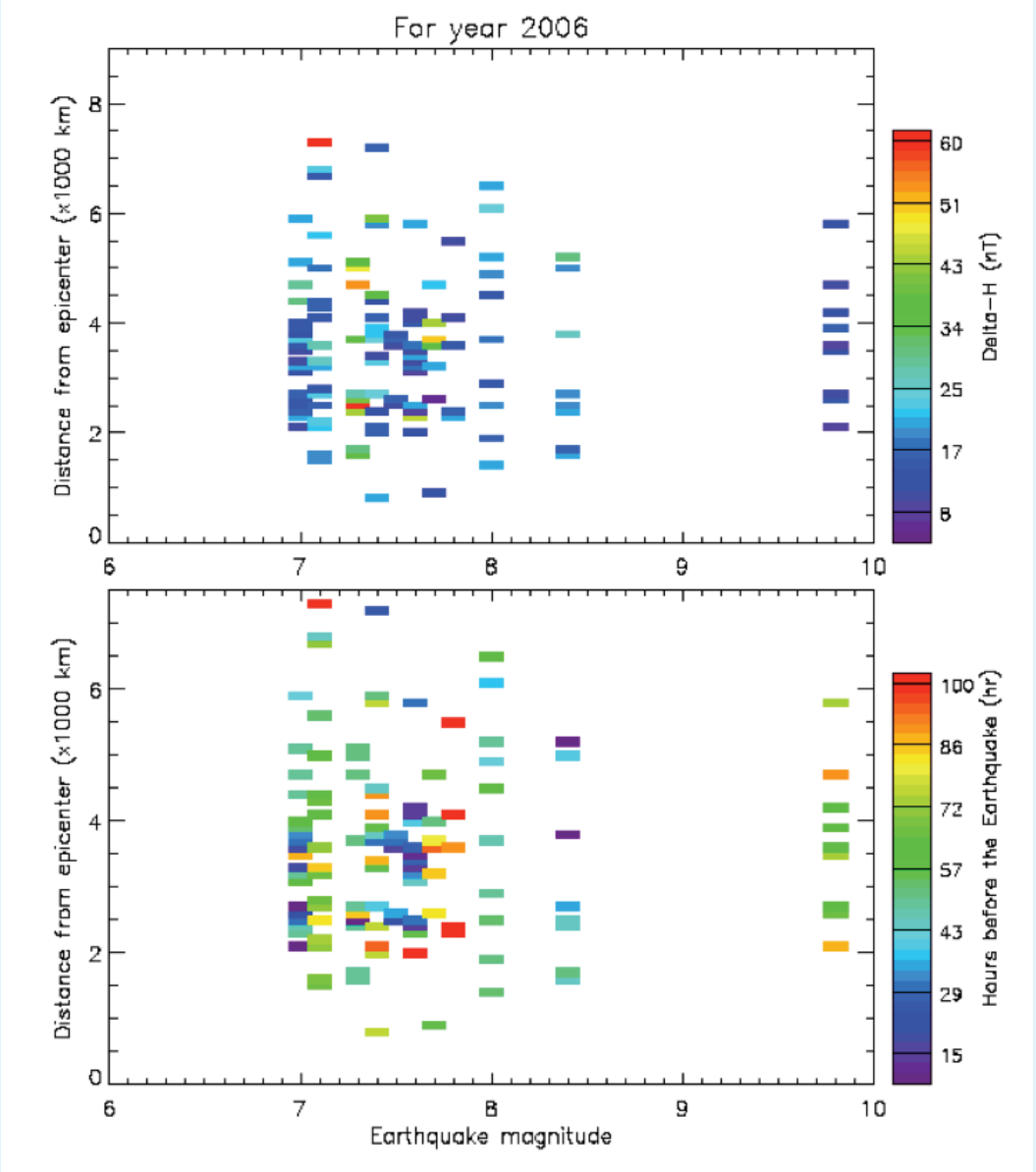

Figure 1: The contour maps display data from 2006. Top panel shows distance from the epicenter as a function of Delta H and earthquake magnitude. Bottom panel shows distance as a function of the time before an earthquake of a magnetic perturbation and earthquake magnitude.

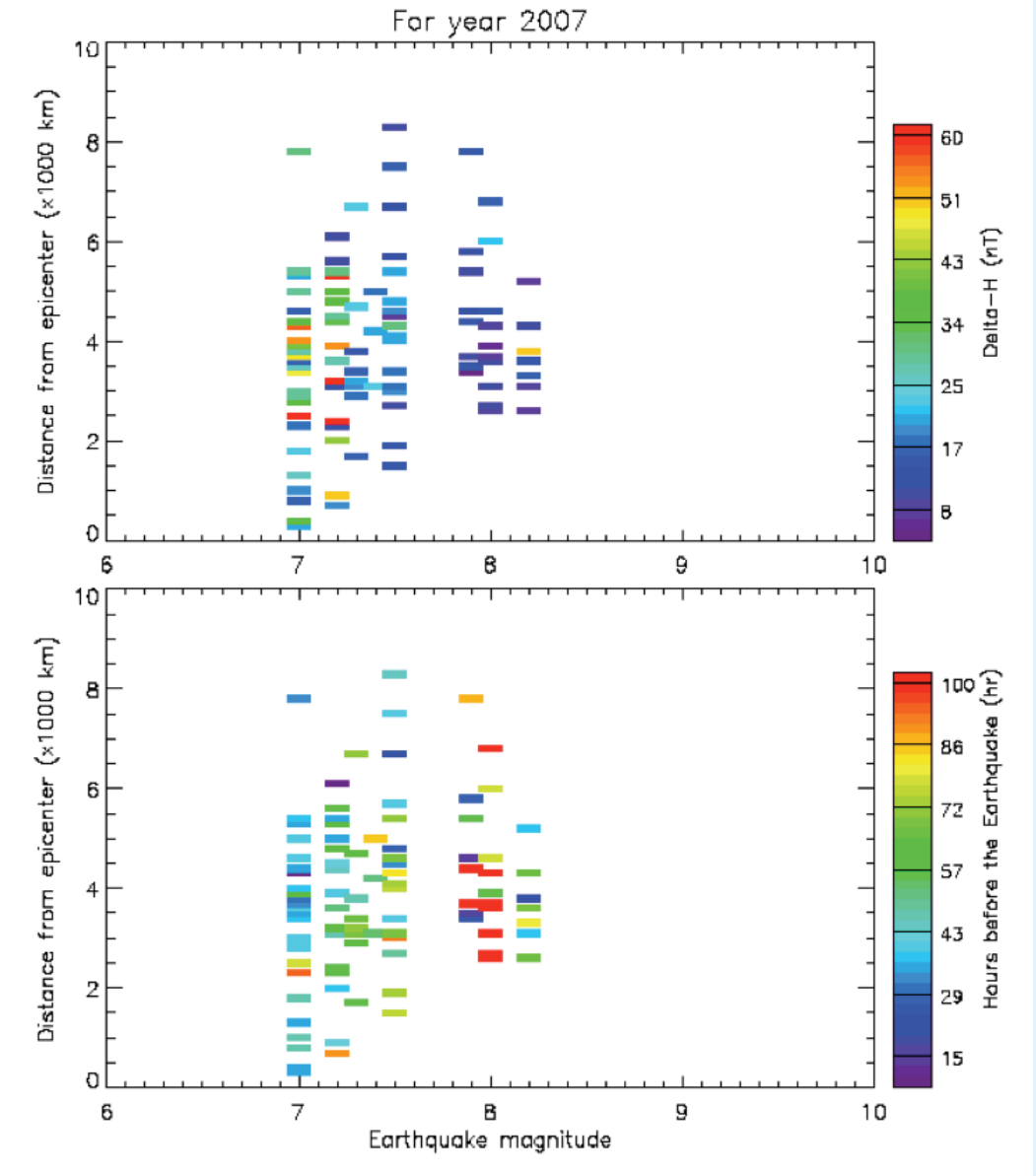

Figure 2: The contour maps display data from 2007. Top panel shows distance from the epicenter as a function of Delta H and earthquake magnitude. Bottom panel shows distance as a function of the time before an earthquake of a magnetic perturbation and earthquake magnitude.

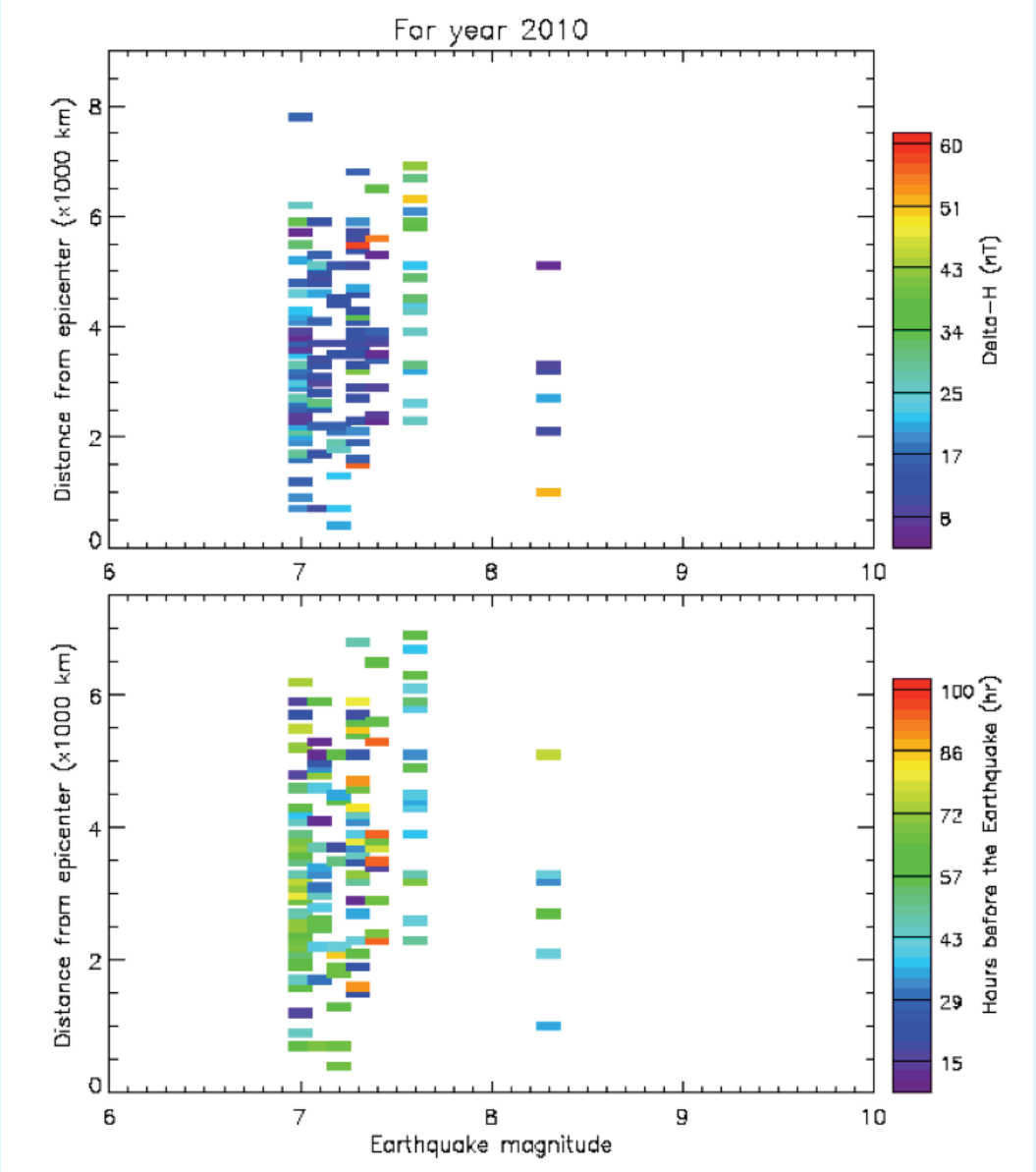

Figure 3: The contour maps display data from 2010. Top panel shows distance from the epicenter as a function of Delta H and earthquake magnitude. Bottom panel shows distance as a function of the time before an earthquake of a magnetic perturbation and earthquake magnitude.

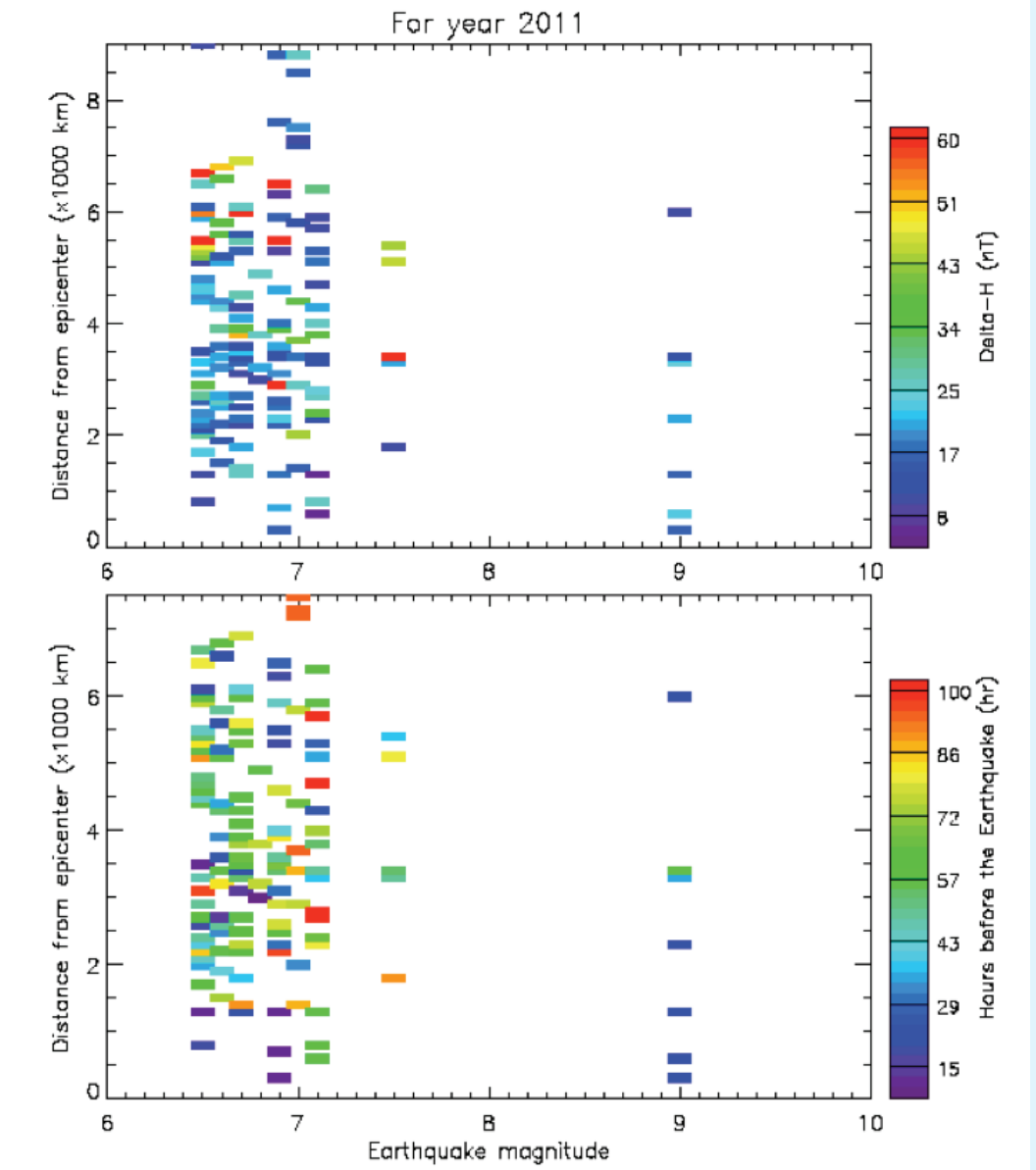

Figure 4: The contour maps display data from 2011. Top panel shows distance from the epicenter as a function of Delta H and earthquake magnitude. Bottom panel shows distance as a function of the time before an earthquake of a magnetic perturbation and earthquake magnitude.

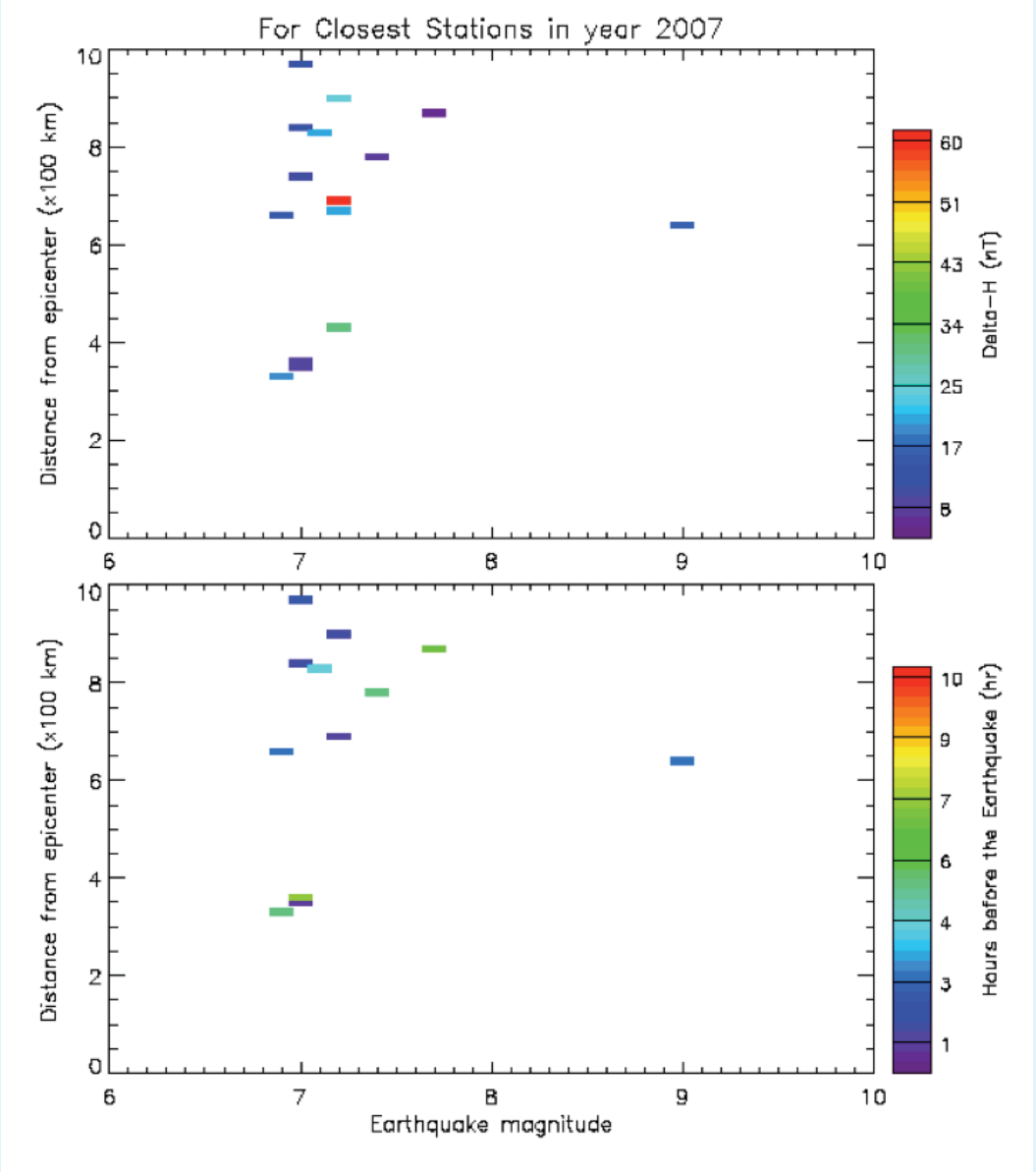

Figure 5: The contour maps display data from 2007. Only stations within 1000km and magnetic perturbations that occurred simultaneously with earthquakes are considered. Top panel shows distance from the epicenter as a function of Delta H and earthquake magnitude. Bottom panel shows distance as a function of the time before an earthquake of a magnetic perturbation and earthquake magnitude

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DREAMING REALITY

Exploring the Connection Between Episodic Memory and the Realistic Dream

ANNA-KARINA TRILLERAS

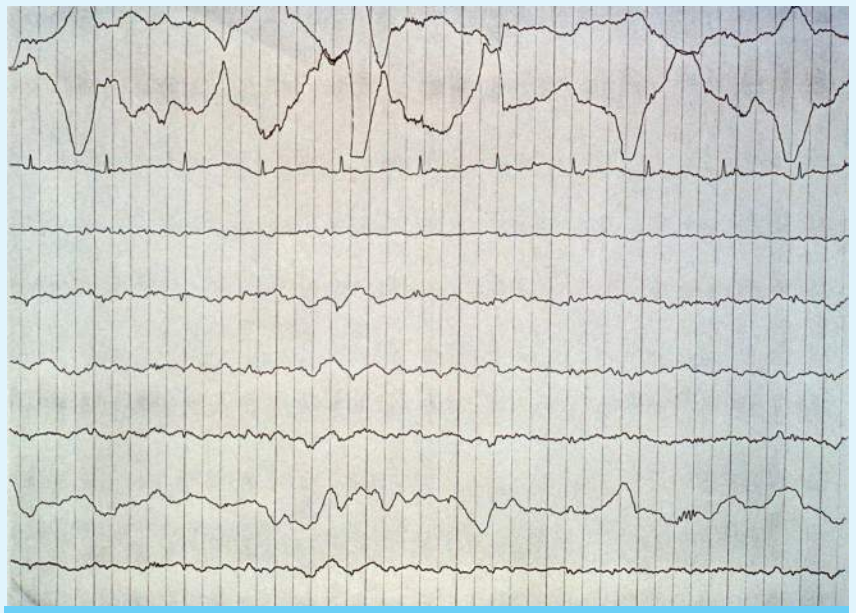
IN MODERN-DAY PSYCHOLOGY THERE APPEARS A RISING TREND OF STUDIES DEVOTED TO RESEARCHING NOT ONLY THE PURPOSE, BUT ALSO THE NEUROLOGICAL BENEFITS AND CONSEQUENCES OF DREAMING. IN A GROWING DEPARTURE FROM FREUD'S PSYCHOANALYTIC THEORY, PSYCHOLOGISTS HAVE BEGUN TO UNDERSTAND DREAMING AS A BIOLOGICAL PROCESS—ONE WITH NOTICEABLY MEASURED BENEFITS AND CONSEQUENCES. THIS ARTICLE EXAMINES THE RECENT BUT ASTOUNDING CONNECTION BETWEEN DREAMING AND MEMORY PROCESSING. RESEARCH INVOLVING REM AND NON-REM SLEEP DATA, THE DREAM-LAG EFFECT THEORY, AND THE CONTINUITY HYPOTHESIS, AIMS TO CONNECT WHY WE DREAM AND WHAT WE DREAM TO OUR WAKING EMOTIONS AND MEMORIES AND TO EXPLORE THE NEUROLOGICAL AND PSYCHOLOGICAL ASSOCIATION BETWEEN THE TWO PROCESSES.

Why do we dream what we dream? There is an emerging theory among today's leading psychologists that what people dream is directly related to their memories. The association between dream content and memory processing is an in-depth and complicated study. Does daily memory truly affect unconscious mental state and sleep at night? If indeed memory does affect dreams, which portions and aspects of memory shape dreams; which elements of memory factor into the creation, mood, and appearance of dreams; how often do they appear, and how significant are they? The experimentation of dream-lag effects, continuity hypotheses of dreaming, and emotional linkages within the study of dream and memory all question the psychological relationship, and propose both sides of the argument. Research on the topic gives both support and opposition to the conjecture that dream content and memory processing are related, as well as the extent to which they are related. A solid, infallible answer may never exist, but probing the study may help to find exactly what correlations between memory and sleep are virtually undeniable. Essentially, when studying the relationship between rapid eye movement (REM) and non-rapid eye movement (NREM) produced dreams and memory consolidation, researchers are able to identify which elements from either episodic or semantic memory appear in either dreams of REM sleep or dreams of NREM sleep, and to what discernable extent. Breakthroughs and studies have led to a possibility of discovering how closely related and critical our memory ultimately is in relation to our dreams.

Evidence from new studies is currently showing that REM sleep and NREM sleep are involved with memory processing.[1] REM sleep is characterized by low-amplitude, fast electroencephalographic (EEG) oscillations, rapid eye movements, and decreased muscle tone.[2] During REM sleep, the activity of the brain's neurons is similar to that seen during waking hours. The second major type of sleep, NREM sleep, is characterized by different stages, the deepest of which is Slow Wave Sleep (SWS). During SWS, the phase of sleep from which it is hardest to wake up, large-amplitude and low-frequency EEG oscillations occur.[3] NREM sleep primarily dominates the first half of sleep, whereas REM sleep dominates the second half. When delving into the topic of dreaming, a crucial difference has been discovered between REM and NREM sleep.[4] Dreaming is prevalent in the REM sleep state, and the most vividly recalled dreams come from this period of the night when there are no dominating brain waves.[5] Since the brain is referred to as an "off-line computer" during REM sleep, and it is disconnected from outside sensory input, there are certain coded templates from the REM state searching out meaningful information from memory in order to connect and create a perception of reality.[6] REM state is ultimately the reality generator, making the reality of dreams from this state feel profoundly rich. This does not mean that the dreams mimic real life. Instead they feel just as real as events occurring in waking life. Dreams from REM are often described as "so real and meaningful," making them more memorable in recall.[7] Hence, past research has consistently focused on REM sleep in study-

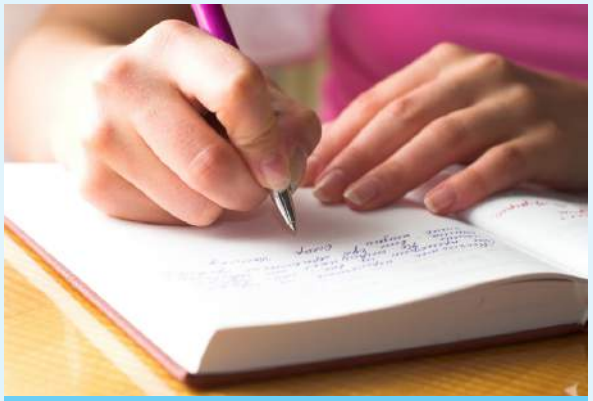
"During REM state dreams, humans are able to ignore certain limitations that they face in everyday life, thus allowing them to dream of flying, walking on water, interacting with someone they've never encountered before, or create entirely new environments and landscapes."

ing dreams, practically neglecting the fact that dreaming also occurs in the NREM sleep state. In a review, psychologist T.A. Nielson examined 29 REM dream and 33 NREM dream recall studies, and recorded that there was an average 81.8% dream recall rate for REM sleep and an average approximate 50% dream recall rate for NREM sleep. The unexpected 50% recall rate for NREM dreaming suggests that some NREM dreams are similar in either semantic or emotional content, or at least possess an equally memorable element to that of REM dreams.[8] The data proposes that dreaming, which was only associated with REM sleep and easily recollected REM sleep state dreams, may span across all states of sleep such as NREM. This supports the idea that stream of consciousness, dreaming, and cognitive brain activity never cease throughout the night, and REM including NREM sleep states are both acceptable states to study for diverse and specific dream content.[9]



AN EEG (ELECTROENCEPHALOGRAM) OF A SLEEPING PERSON

Within each of these sleep states, memory content significantly factors into the role of dreaming. With respect to episodic memory, REM sleep and NREM sleep are unique from each other.[10] Episodic memory, memory of past events that integrates material concerning the time, place, and context of said events, is usually differentiated from semantic memory, which is more worldly, factual knowledge. There has been endless research to determine which memory appears in or dominates each sleep state. Overwhelming research data points to the rareness of episodic memory in the REM state.[11] The majority of studies find that during REM sleep, episodic memory may on occasion appear, but as disconnected fragments, unable to be connected back to waking events.[12] David Foulkes, a major researcher in the field of sleep and memory, concluded that during this REM sleep state, it is unlikely for episodic memory to appear due to the increased EEG oscillations taking place.[13] As a result of the brain's surging electrical, neuronal, and chemical activity, it is very difficult to retrieve episodic memory during this REM stage. As Foulkes explains, most REM stage dreams defy the rules of reality, with reality being the ultimate basis of episodic memory.[14] During REM state dreams, humans are able to ignore certain limitations that they face in everyday life, thus allowing them to dream of flying, walking on water, interacting with someone they've never encountered before, or creating entirely new environments and landscapes.[15] Foulkes' theory led to the Foulkes Dream-Like Fantasy Scale, in which dreams are rated on a scale of 0-8, ranging from no dream or an unrecalled dream to a visually bizarre and very realistic dream. After rating a dream from REM sleep, researchers were able to see that the more bizarre and seemingly unreal the dream was, the less episodic memory would even factor or appear in the dream. Semantic memory, however, could be greatly associated within the REM sleep state dream, and possibly even traced back to conscious knowledge.[16]



SOMETIMES DREAM JOURNALS ARE USED TO HELP STUDY OTHERWISE EPHEMERAL DREAMS.

Accordingly, episodic memory is known to appear in NREM dreams by an overwhelming margin. In a recent study, psychologists from both Boston University and Harvard University were able to propose an argument in which episodic memory is most prevalent in NREM sleep, and consequently nonexistent in REM sleep. The study involved one 19-year old female subject keeping a daily diary, a sleep diary, and recordings of her dreams for two months.[17] Not only did the experiment aim to determine which dreams of REM or NREM sleep contained which elements of memory, but also how often they appeared, to what extent, and how long the memory traces were.[18] The subject recorded the events of her day in a diary, writing of certain events, people, and places she encountered, and also recorded her mood, or level of happiness, for the preceding day. Her sleep diary was filled out immediately before going to bed and immediately after she woke up in the morning. Her entries before bed included any medications, alcohol, caffeine, or drugs consumed, and how her mood, was for that day.[19] In the morning, she recorded what time she went to bed, how long it took her to fall asleep, how many times she awoke during the night, and if she remembered any dreams. The most vital portions of this study were during the nights when the female subject preset four alarm clocks, waking her up four different times during every other night to record dreams she had at those certain times, and when the study was completed, comparing her dreams to memories from the diaries. The experiment revealed not only something called "the dream-lag effect," which is the time interval between witnessing the waking day's events, objects, people, or emotions and then witnessing the same ones during a dream state, but also that elements of her memory were in fact present throughout her dreams.[20] In this study, elements of memory, specifically characters, settings, themes, and actions, appeared in the individual's dreams roughly 1.6-2.5 days after they were noted in her diary.[21] Emotions appeared with the shortest lag, appearing in her dreams in 1.5 days. Objects and events from her memories had the greatest lag, appearing as much as 3.5 days later. These results support the argument that dream elements do reflect memory, but occur in a patterned way that is both time and stage dependent. In respect to memory processing, 67% of dreams occurring in both early NREM-rich and late REM-rich sleep contained the same matching memory elements.[22] Thus, related dream elements may not only reflect memory from recent days, but may also reflect certain, specific stages of memory processing.

Particular dream elements, especially color, have also triggered many theories regarding how large a role memory plays in our dreams.[23] More than just color itself, the absence of color within dreams, or dreaming in black and white, has led researchers to study whether faulty memory of the day accounts for lack of color in dream.[24] Following the continuity hypothesis of dreaming, which states that dreams reflect waking life, one such study color trained subjects throughout the day.[25] The researchers showed the subjects 26 cards of certain pictures, containing both colored objects and black and white objects. The subjects were required to study the unique colors of the objects, as well as the lack of colors. Subjects were also required to study the colors of a unique circus picture from a children's storybook.[26]

After being asked questions about the colors, the subjects proceeded through the day as usual, went to sleep, woke up, and then recorded the objects and colors (if any) that appeared in their dreams. The idea suggests that throughout the course of the day, the subjects of the study were exposed to extremely vivid and unique colors, as well as objects in black and white, and that those aspects had become part of their episodic, visual memory.[27] The study

showed, however, that faulty memory processes might play a role in why some people dream in black and white. Those who experienced trouble visually recalling the colors from the day also experienced trouble in dream recall frequency, thus causing them to state that perhaps their dreams were in black and white.[28] Subsequently, those who were highly trained in recalling the colors from the day, and were able to recall their dreams, indicated a high percentage of "colored dreams."[29] Although the study did show that those with better-trained color memory recalled more colorful dreams, the study failed to support the entire hypothesis, as the exact colors from the day and waking events did not appear specifically in the dream. However, the study suggests that people who have a faulty memory from waking life, and do not remember details such as colors from certain waking events, will not remember as many incorporated colors that appear in their dreams. This idea proposes that humans do not actually dream in black and white, but rather have poor memory of the colors within their dreams; thus interpreting lack of color, or rather lack of attention to color, as "black and white dreaming."

"This idea proposes that humans do not actually dream in black and white, but rather have poor memory of the colors within their dreams; thus interpreting lack of color, or rather lack of attention to color, as 'black and white dreaming.'"

In relation, mood congruency may also explain how memory affects our dreams. Researchers have studied how daytime mood, or feelings, may influence our dreams. This suggestion mirrors the continuity hypothesis of dreaming, stating that moods during waking events may carry over into the night.[30] Studies aim to investigate how negative waking events, such as those that cause stress or increase anxiety, affect or cause similarly negative dreams, or what are commonly referred to as nightmares.[31] If negative episodic memories were able to consistently affect our dreams, it would appear that stressful days or events most often lead to similarly stressful dreams.[32] On the contrary, one study found that even participants who recalled more negative items in a memory task did not recall negative dreams any more than recalling positive dreams. Because they were manipulated into creating a negative mood, it was assumed that they would carry this mood over into the night or nights following, and be able to recall the "congruent negative mood." However this was not the case.[33] Hence, it could be argued that mood congruency in given memory tasks and in daily episodic memory may not affect the nighttime mood or dream for any given person.

Countless research, pertaining to the complex association between dream content and memory processing, aims to uncover just how much memory factors into the development of dreams. Dream content, it seems, does reflect memory. Whether it is semantic memory in REM sleep, or in-depth episodic memory in NREM sleep, memory traces are evident within the findings of researchers and psychologists.[34] The occurrence of dream-lag effects, the continuity hypothesis of dreaming, and mood congruency effects all provide evidence that memory appears in our dreams. Mood can affect dreaming, but it is not biased towards negative or positive emotions, and it may not occur frequently.[35] The more established memory is throughout the day, the more likely it is to appear within our dreams, though it does not shape the entirety of our dreams. Even though the "day residue effect" does exist, meaning that elements from memory of the day may appear within the same night, researchers find that the dream-lag effect is

much more prominent. Only certain elements from our memory experience this type of dream-lag effect and are processed much later.[36] Many have formulated an idea that there may be a dream-lag effect due to the emotional and personal aspect of certain elements from the day.[37] A 2007 study concluded that this effect involves a latent, emotional facet that these dream and memory elements contain. It may be that these elements reflect the mind's practice of emotional processing. The dream-lag may reflect how the mind works through interpersonal difficulties, reflects emotional or relationship resolution, and reformulates certain elements of memory into either new negative or positive memories. Thus, because of this extra emotional processing, these elements appear much later than elements experiencing the day residue effect.[38] Expressive aspects of episodic memory that matched within dreams such as characters, emotions, settings, themes, and actions all had a shorter dream-lag effect than elements such as objects and events.[39] Perhaps the consolidation of certain aspects of memory reveal not only why we dream what we dream, but also how we feel, and how our dreams are ways of emotional self-understanding.[40] The research into elements, color, mood congruency, lag effects, and continuity within dreaming may all trace back to our everyday memory. Because memory shapes the way we live our lives, our personalities, decisions, moods, and emotions in our conscious waking state, it may even transcend further into our unconscious state, playing the greatest role in our dream sleep states: revealing why we dream what we dream.

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AVOIDING THE POTTERY BARN RULE

Understanding the United States and NATO's Engagement in the Libyan Revolution

NARINTOHN LUANGRATH

THIS ARTICLE ATTEMPTS TO EXPLAIN AMERICAN INVOLVEMENT IN THE 2011 MULTILATERAL INTERVENTION IN LIBYA. BECAUSE NORTH AFRICA IS A LESSER POLICY PRIORITY FOR THE UNITED STATES THAN THE MIDDLE EAST, IT COULD BE ARGUED THAT THE UNITED STATES WAS NOT POISED TO GAIN MATERIALLY FROM INVOLVEMENT IN LIBYA. THUS, THE ARTICLE TURNS TO TWO ANALYTICAL PERSPECTIVES IN INTERNATIONAL POLITICS, NEOLIBERAL INSTITUTIONALISM AND CONSTRUCTIVISM, IN ORDER TO EXPLAIN AMERICAN SUPPORT FOR THE FRENCH AND BRITISH-LED EFFORT. THE STRUCTURE OF THE NORTH ATLANTIC TREATY ORGANIZATION ALLOWED FOR THE EMERGENCE, EVOLUTION, AND ADVANCEMENT OF SOCIAL NORMS AMONG MEMBER STATES. INSIGHTS ON ORGANIZATION STRUCTURES AND ALLIANCES OFFERED BY NEOLIBERAL INSTITUTIONALISM ARE COMPLEMENTED BY THE SOCIAL NORMS CRAFTED AND CHANGED THROUGH THESE INSTITUTIONS. THE "RESPONSIBILITY TO PROTECT" DOCTRINE SUPPORTED IN 2006 BY THE UNITED NATIONS SECURITY COUNCIL FURTHER ILLUSTRATES THE MUTUALLY REINFORCING RELATIONSHIP BETWEEN NEOLIBERAL INSTITUTIONALISM AND CONSTRUCTIVISM. HUMAN RIGHTS NORMS WERE MANIFESTED INTO READILY DISCERNIBLE ACTION: MILITARY INTERVENTION IN LIBYA.

During his 2008 presidential campaign, Barack Obama argued that the United States needed to stop proselytizing democracy and pursuing military action in the Middle East under the guise of humanitarian assistance.[1] Recent military ventures—from Kosovo in 1998 to Iraq in 2003—have stretched American resources and distracted from true policy priorities.[2] Thus, Obama's slow response to France and Britain's calls for assistance after the outbreak of the Arab Spring in late 2010 tested the strength of the Transatlantic Alliance, and the historic political, economic, and cultural ties between the United States and Europe. The level of America's eventual participation in the intervention led pundits to oxymoronically characterize Obama's foreign policy doctrine as "leading from behind."[3] In order to explain Obama's decision to join the military intervention in Libya, this article will look at two analytical perspectives in international relations: liberalism and constructivism. Neoliberal institutionalism in particular will be focused on in this article, as America's North Atlantic Treaty Organization (NATO) commitments were manifested in Operation Unified Protector, which enforced the United Nations Security Council Resolutions 1970 and 1973 through a no-fly zone and arms embargo during the intervention in Libya.[4] Ultimately, the constructivist model supplements neoliberal institutionalism, particularly with respect to cultural norms emerging from alliances.

Unlike realism, liberalism argues that the state is just one of many actors. Although liberalism still subscribes to the anarchic description of the world envisioned by realists, liberals stress the possibility for cooperation by emphasizing absolute over relative gains. While realism emphasizes the enduring conflictive tendency of states, liberalism focuses on how these tendencies can be mitigated. International institutions, domestic political groups, states and individuals all influence the international system. Liberals also denounce defensive realism's balance-of-power theory, which argues that the world is more secure when states attempt to balance against one powerful, hegemony-seeking state.[5] However, there are several strands of liberal thought. Michael Doyle concludes that liberal states are inherently more peaceful and that the spread of democracy and Western liberal values decreases the chance of war.[6, 7] In furthering conflict prevention, Richard Rosecrance argues that trade fosters interdependence, trust, and mutual collaboration.[8] Andrew Moravcsik emphasizes the influence of domestic societal actors in affecting state policy, contrary to realism's view of states as unitary actors.[9]

However, neoliberal institutionalism, as described by Robert Keohane, helps to explain American engagement in Libya. Keohane states that international institutions (e.g. NATO, International Monetary Fund) help maintain cooperation between states. These institutions encourage the fostering of common interests among states while providing a framework for negotiations.[10] Maintaining institutions entails costs, but these costs are generally lower than those involved in creating new ones.[11] Keohane emphasizes the incentives for states to cooperate through institutions; they allow countries to return to a reliable negotiating table, as compliance with institutional expectations leads to collective gains by all parties involved.[12]

"On a practical level, acting through NATO also allowed the United States to avoid what Colin Powell termed the 'Pottery Barn rule' of foreign policy ('you break it, you own it'), referring to America's heavy military and moral obligations after the 2003 invasion of Iraq."

U.S. foreign policy expert Justin Vaïsse hailed the European-led effort in Libya as a "template for future operations" for the Transatlantic Alliance.[13] State interests, according to neoliberal institutionalism, do not rest solely upon material gains. Since North Africa is less of a policy priority for the United States when compared to the Middle East, it could be argued that the United States was not poised to gain materially from involvement in Libya. However, neoliberal institutionalism would have predicted U.S. involvement in Libya, as NATO commitments assured mutual assistance between the United States and its European powers. North Africa is Europe's backyard, and promoting prosperity and security in the region has been a part of European foreign policy priority for decades, particularly in response to increased illegal immigration and terrorism.[14] Reciprocity fosters the idea that if the United States ever needed help in the future, it could rely on its partners. On a practical level, acting through NATO also allowed the United States to avoid what Colin Powell termed the "Pottery Barn rule" of foreign policy ("you break it, you own it"), referring to America's heavy military and moral obligations after the 2003 invasion of Iraq.[15] Thus, institutions like NATO allow for greater shared responsibility when responding to crises.

However, neoliberal institutionalism fails to predict some aspects of U.S. involvement in Libya. In his 2009 Cairo speech, Obama's decreased use of pro-democracy rhetoric reflected the sentiment that such rhetoric was tainted by former President George W. Bush's so-called freedom agenda in the Middle East. However, some suspected that the West saw the outbreak of protests in North Africa as a potential democratic opening for countries like Tunisia, Egypt, and Libya, all of which had been governed by despots for decades. For example, Western governments' concerns over the Muslim Brotherhood's influence in Egyptian elections prompted suspicion: Was the multilateral intervention in Libya ultimately aimed towards the emergence of a democratic government friendly to the West? If that is the case, perhaps republican liberalism, which argues that liberal democracies are more peaceful than undemocratic states, would be a superior explanation.

COLIN POWELL, THE 65TH UNITED STATES SECRETARY OF STATE, SERVED UNDER PRESIDENT GEORGE W. BUSH FROM 2001-2005.

More significantly, neoliberal institutionalism also fails to explain why some NATO countries did not send military support during the intervention. France and Britain lacked adequate resources to successfully complete the intervention by themselves. Former Defense Secretary Robert Gates believed Libya affirmed Europe's inability to fight on its own. He noted that the "the mightiest military alliance in history is only 11 weeks into an operation against a poorly armed regime in a sparsely populated country—yet many allies are beginning to run short of munitions."[16] Other U.S. officials pointed to a "free rider problem."[17] French President Nicolas Sarkozy's and British Prime Minister David Cameron's frustration with initial American passivity further undermines the argument that institutions increase cooperation between states. Realists would argue that NATO's divided stance on Libya shows

A PROTEST IN LIBYA DURING THE ARAB SPRING OF 2010

that the efficacy of international institutions depends on the backing of great powers like the United States.

Clearly, liberalism has several shortcomings in explaining U.S. involvement in Libya. Constructivism provides a more comprehensive explanation by taking into account the process of norm creation, which makes up for some of neoliberal institutionalism's explanatory gaps. Constructivism emphasizes the role of domestic structures in diffusing international norms.[18] Norm diffusion is highly dependent on cultural match; a country is more likely to adopt international norms or practices if they coincide with their own domestic norms and practices. Identity is also inherently relational, since states act toward each other on the basis of what each country means to them, and not necessarily for material reasons. Moreover, states can shift their behavior to match international norms.[19] Unlike realists' belief that anarchy necessarily leads to inter-state conflict, constructivists argue that anarchy is "what states make of it"; decisions are not always made on the basis of cost-benefit calculations but rather by a logic of appropriateness.[20]

State preferences and identities are highly malleable products of specific historical processes.[21] Peter Katzenstein argues that states should be viewed as social actors, not unitary ones, and that their interactions do not simply emerge out of a pre-set structure.[22] However, constructivism is often criticized because, unlike realism and liberalism, it lacks policy prescriptions. It also works best when explaining events in hindsight rather than predicting their occurrences. Perhaps this is because constructivism emphasizes less readily discernible and quantifiably measureable concepts like norm and identity construction. For ex-

BARACK OBAMA, THE 44TH PRESIDENT OF THE U.S.

ample, Jutta Weldes stresses the importance of language in such constructions, stating that national interest functions as a rhetorical device through which the legitimacy of and political support for state action is generated.[23]

The process of norm construction with respect to humanitarian intervention best explains America's cooperation with France and Britain. The United States and Europe enhanced the legitimacy of the Libya mission by "operating under the NATO flag."[24] Martha Finnemore critiques realism and liberalism's lack of explanation for intervention in countries where states have little to no strategic interest, notably pointing to the 1989 U.S. intervention in Somalia.[25] Humanitarian intervention may have largely benefited European Christians in the nineteenth century, but today expands its focus to include all human beings into the normative discourse on human rights.[26]

The dynamism of human rights norms construction and evolving justifications for humanitarian intervention would have predicted American involvement in Libya. Lessons were learned from former President Bill Clinton's passive stance early on during the Bosnian conflict and the 1994 Rwandan genocide.[27] After being passive during the suppression of Iran's Green Revolution, Obama eventually "felt the need to do something" regarding Libya.[28] Constructivism assumes that leaders reflect on historical precedents and learn from the mistakes of their predecessors. This combination of reflection and acceptance of evolving humanitarian norms led the United States to support the French and British-led coalition. In calling Libyan protestors "cockroaches" and "rats" that did not deserve to live, Muammar Qaddafi's rhetoric also signaled intent to harm his own people. His language was reminiscent of the "hate media" broadcasts of Radio Mille Collines, which spurred on the perpetrators of the Rwandan genocide.[29]

Changing norms also applies to military methods. NATO's bombing campaign during the Kosovo War had some success. It also shaped future military action and undoubtedly influenced the preference towards air strikes during the Libya intervention. Air strikes are politically popular since they avoid costly land invasions and offer a psychological assurance that only the bad guys are hit. Whether the latter is accurate or not is debatable.[30] Over time however, the socially constructed idea of a less costly method of fighting emerged as a new option in warfare.

Even so, constructivism in the context described fails to explain why the United States took so long to support the coalition, despite ideological commonalities and mutual commitments of support between the allies. When he eventually decided to get involved, Obama's "desire to hand off the mission to Europeans as quickly as possible" was evident.[31] The state of the U.S. economy and military burdens in the Middle East weighed heavily on Obama's mind. Realists would possibly view Obama's reluctance as reflective of a cost-benefit calculation of intervention. Despite any cultural affinities, ideological harmonies, and promises of mutual support with Europeans, Obama's initial hesitance and later unenthusiastic support was reflective of a state methodically weighing the material advan-

tages of intervening in a region that, unlike the Middle East, was uncritical to its interests.[32]

The realist explanation is refuted by virtue of the fact that the United States supported the intervention anyway. Although eager to distance itself from wars in Muslim-majority countries, the United States still provided valuable intelligence, logistical support, and air-to-air refueling.[33] Constructivism also accounts for factors like "shaming" and pressure placed on member states to conform to certain norms or expectations. These activities were evident through Sarkozy's early pleas for U.S. military cooperation and later, his criticism of America's reluctance.[34]

Constructivism alone is insufficient as an explanation of American involvement in Libya. Constructivist explanations concerning the development of norms can be supplemented by aspects of neoliberal institutionalism. International institutions help maintain mutual support and cooperation between states. Finnemore makes clear that multilateral humanitarian intervention is not always more successful when done multilaterally. However, she does argue that institutions like the United Nations help construct and shape a normative discourse on human rights while conferring authorization to states' actions.[35] In recent years, the legitimacy of humanitarian interventions has been judged by their level of multilateral support, a normative construction made possible by (and largely emerging from) the interaction of states in international institutions. Unlike America's invasion of Iraq, approval for airstrikes on Libya went through the UN and was ultimately employed through a multilateral effort, increasing the legitimacy of the intervention. Constructivist explanations help close the explanatory gap that Finnemore exposes in her concern over the efficacy of multilateral over unilateral interventions. Cultural and ideological affinities between the United States and other NATO countries, especially among the traditional great powers of the Transatlantic Alliance, allowed for neoliberal institutions to emerge in the first place. These cultural ties, further evolved overtime, were structurally supported by the institutions, and were eventually manifested through multilateral action to achieve a common foreign policy objective and/or advance a common normative view. In this case, these aims were manifested in U.S.-European military action in Libya.

Celeste Wallander discusses how NATO's structure not only systematizes its members' military actions, but also shapes their political behavior. She writes, "NATO rules and practices [are] leverage for shaping the aspirant members' political systems, and membership would ensure that their defense policies and military capabilities would not be instruments for threatening one another."[36] Thus, the creation of NATO decreased transaction costs between members and provided the organizational structure needed to carry out the Libyan intervention. NATO's structure also allowed for the emergence, shaping, evolution, and advancement of social norms among member states. Namely, constructed doctrines like the "responsibility to protect" affirmed in 2006 by the UN Security Council serve as further evidence of the mutually reinforcing relationship between neoliberal institutionalism and constructivism.[37] Wallander continues:

> Many of NATO's distinctive features had nothing to do with coping with the Soviet threat at all and were a result of NATO's more subtle purpose of preventing a cycle of mistrust, competition, and instability in security relations among its members. NATO therefore developed specific assets for coping with risks among its members—primarily but not exclusively with Germany in mind. These features include mechanisms for political-military integration, multi-nationality of alliance structures, supranational defense policy, and the principles and procedures of civilian democratic control of defense affairs.[38]

The emphasis on structure per neoliberal institutionalism and on norm development per constructivism is evident with NATO action in Libya. As a member state, the United States was shaped by socially and historically constructed norms on humanitarian intervention. The structure of the international organization, however, allowed for these theory-based norms to be manifested into readily discernible action: military intervention in the name of human rights.

Although constructivism serves as a more comprehensive explanation of American involvement in Libya, relying on one analytical perspective can be problematic. Insights on

organization structures and alliances offered by neoliberal institutionalism are complemented by the social norms crafted and changed through these institutions. Both perspectives are mutually reliant to make up for each other's explanatory shortcomings. The political structure for consultation and decision-making developed during the Cold War proved to be a reliable asset for future transatlantic military cooperation in Libya.[39]

NOTES

1 Lizza (3)
2 Ibid.
3 Krauthammer (1)
4 United Nations Security Council, "Resolution 1973 (2011)"
5 Walt (4)
6 All references are scholars of international relations unless otherwise noted.
7 Doyle (213)
8 Rosecrance (30)
9 Moravcsik (240)
10 Keohane (86)
11 Wallander (706)
12 Keohane (85)
13 Vaïsse (1)
14 Santini (1)
15 Haddick (1)
16 Valasek (1)
17 Ibid.
18 Checkel (85)
19 Hurd (6)
20 Hurd (5)
21 Walt (4)
22 Katzenstein (17)
23 Weldes (8)
24 O'Donnell and Vaïsse (1)
25 O'Donnell and Vaïsse (154)
26 Finnemore (184)
27 O'Hanlon (2)
28 Ibid.
29 The Economist (1)
30 Barkawi (2)
31 O'Hanlon (1)
32 Ibid.
33 Pawlak (3)
34 Pawlak (4)
35 Finnemore (184)
36 Wallander (720-21)
37 Barkawi (1)
38 Wallander (716)
39 Wallander (724)

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LINES IN THE SAND

Plato and Isocrates' Dueling Schools of Philosophical Thought

COREY STREITWIESER

PREVAILING SCHOLARLY OPINION HAS SHOWN THAT IN THE EARLY FIFTH AND LATE FOURTH CENTURIES BCE, THE ANCIENT GREEKS, CAPITALIZING ON BOTH INCREASING LITERACY RATES AND THE SUPPLANTING OF POETRY WITH PROSE AS THE MEDIUM OF INTELLECTUAL EXCHANGE, BEGAN TO DEFINE THEIR DISCIPLINES WITH GREATER DETAIL. THIS ARTICLE CONCENTRATES ON IDENTITY FORMATION AMONG ATHENIAN PHILOSOPHERS IN THE EARLY FOURTH CENTURY, PHILOSOPHERS WHO WERE TRYING TO STANDARDIZE THEIR DEFINITIONS OF PHILOSOPHY IN A TIME WHEN MANY WRITERS EMPLOYED THE TERM TO DESCRIBE A NUMBER OF MUTUALLY EXCLUSIVE INTELLECTUAL PURSUITS. PLATO, IN HIS *GORGIAS*, MAKES A CONCERTED EFFORT TO UPEND THE PREVAILING RHETORICAL PHILOSOPHY CHARACTERISTIC OF HIS GREATEST COMPETITOR, ISOCRATES, AND TO LEGITIMIZE HIS OWN VIEW OF PHILOSOPHY, WHICH WAS UNDERGIRDED BY MATHEMATICAL STUDY.

INTRODUCTION

> "In Plato's dialogues, we find what appears to be the first serious attempt at a philosophy of mathematics."[1]

So wrote Sir Thomas Heath in a lauded tome on Greek mathematical history. It is tantalizing to imagine how a Greek intellectual of the fourth century BCE would have defined either "philosophy" or "mathematics." Two men, Plato and his less remembered, though equally prominent, counterpart Isocrates opened schools which purported to teach philosophy, schools that held mutually exclusive and diametrically opposed conceptions of what philosophy entailed. The tension between the two schools prompted a discursive battle in their leaders' writings, the aim of which was on the one hand to define the parameters of one thinker's philosophical vision, and on the other, to delegitimize that of a foe.

We set our stage in 390 BCE. Isocrates has just published his tract *Against the Sophists*, wherein he both sets forth the aims and goals of rhetorical training (Isocrates considered rhetoric and philosophy to be the same thing),[2] and distances his project from that of the sophists, a group of men who deceived the masses by means of rhetoric (13.1-8). This article argues that Plato's *Gorgias*, likely published around the same time, aimed to cast mathematics—and emphatically not rhetoric—as the requisite study for philosophy, while also linking Isocrates back to a sophistic antecedent, *Gorgias*, in order to delegitimize Isocratic philosophy by reaffirming its association with sophistry.[3]

An increase in writing in the fifth century brought the Greeks a new medium: prose,[4] in which they could begin to express their thoughts without the limitations of poetry,[5] the currency of Greek intellectual expression for the whole of its previous literary history.[6] A rise in Greek literacy rates further made prose a useful tool for reaching the larger Greek intelligentsia.[7] Writing for an audience brought writers new questions, and the early fourth century saw a wave of emerging writers among the Hippocratic physicians,[8] historians,[9] philosophers,[10] mathematicians,[11] and rhetoricians.[12] Thinkers' willingness to engage each other created highly fraught, carefully wrought strands of thought (notionally, "schools") within each respective discipline, and these schools competed with each other to standardize their personal conception of a discipline in place of an enemy's.

The two thinkers hashed out what philosophy meant to them in their writings—Isocrates upholding the importance of rhetoric, Plato of mathematics. One might think of both systems as competing brands, and both were looking to monopolize the market. The battle to do so left Isocrates and Plato locked head to head in a hypertextual battle in which the two could draw damaging caricatures of each other while also propagating the superiority of their brand of philosophy.

Isocrates' school cultivated rhetoricians capable of governing Athens well, while Plato's dialogues became an invective against political rhetoric, and conferred the title of "philosopher" upon mathematicians. That two men living in the same city at the same time could produce entirely antipodal conceptions of philosophy reveals both that philosophy still lacked a concrete definition in fourth century

PLATO (LEFT) IN "SCHOOL OF ATHENS"

Athens, and that intellectuals like Plato and Isocrates began to narrowly define philosophy through their writings, sparking a competition between the two schools over who had the legitimate right to standardize his conception over against his foe's.

Raymond Wilder, writing on the anthropology of mathematics, observes that "mathematics has not grown in a vacuum. Its roots are imbedded in the needs of the culture that fostered it . . . To ignore this is to [only] partially understand how mathematics has evolved."[13] Accordingly, I will first map Plato's development of Greek geometry onto recent scholarship on the emergence of disciplines, in order to show that mathematics was not only swept up by the late fifth century BCE social current known to scholars as the disciplining phenomenon, but was also inextricably bound to the development of philosophy. Then I will turn to the *Gorgias* and see how in Plato's early writing career, the philosopher was beginning to define his project by welding philosophy to mathematics, with the result that both fields were construed with a character unanticipated before Plato.

Few scholars have considered how Plato's understanding of philosophy was inextricable from his thoughts on mathematics. The questions I am interested in pursuing, then, are a) how the disciplinization of philosophy, in Plato's case, bore the immediate consequence of disciplinizing mathematics in the author's own image, and b) how effectively Plato wrought carefully orchestrated literary works whose end was to demonstrate the superiority of Plato's mathematical philosophy with respect to the philosophy-rhetoric binary of Isocrates's school. Focusing on key sections of the *Gorgias*, I plan to demonstrate that Plato's markedly advanced views on geometry and philosophy were used to delegitimize Isocrates, both persuading readers of his philosophical supremacy and Isocrates' foolishness.

Scholars have shown that Plato, in his *Gorgias*, launched an attack on Isocrates, whose rhetorically-laced curriculum challenged Plato's understanding of philosophy,[14] both by inventing the word rhetoric (*rhetorikē*) and labeling the latter's school as its prime example.[15] The dialogue bears several salient features which makes it ideal for our study: firstly, it was written as a reaction to Isocrates' tract *Against the Sophists*, essentially a "college brochure" in which the latter lays out his pedagogical conception of philosophy and distances himself from sophistry (Plato playfully bastardizes a key quote of the tract in the *Gorgias*).[16] Secondly, the dialogue displays the general shape of Plato's thoughts on rhetoric. Finally, at key moments in the dialogue, Plato invitingly references mathematics, and contrasts it to rhetoric. The *Gorgias* thus marks a crossroads of philosophy, rhetoric, and mathematics—ill-defined though they were at the outset of Isocrates' and Plato's careers—and in it, we find Plato drawing the boundaries of each of the three disciplines.

The disciplinization of Greek schools of thought is marked by the need to find acceptance from others; legitimacy comes from one's ability both to find adherents, and in turn, to impress the reading public. Just as Isocrates, in *Against the Sophists*, attempts to attract students of rhetoric to his school, so Plato seeks to attract mathematicians. If Plato is not an active mathematician to whom we can attribute any concrete findings or proofs, neither is he a distant observer of it.[17] From the scant sources available to us on Plato's life, we find that mathematicians comprised, if not dominated, the circle of philosophers and friends with whom he associated.[18] The *Gorgias*, written before the opening of the Academy—a school whose morning roll call included the names of some of Greece's most eminent fourth century mathematicians—was one early attempt in which Plato calls out to young Greek mathematicians and urges them to join his school.

Rabinowitz notes in his landmark article on the critical importance of the author's intended audience:

> But even if an author makes a serious attempt to write for the "real people out there," the gap between the actual and the authorial audience will always exist. And since all artistic choices, and hence all effects, are calculated in terms of the hypothetical knowledge and beliefs of the authorial audience, this gap must be bridged by readers who wish to appreciate the book. The greater the distance—geographical, cultural, chronological—be-

tween the author and his readers, the more of a challenge this is likely to provide.[19]

Central to our investigation is that we never allow Plato's audience to slip our minds: young Athenian intellectuals whom Plato wants to attract to his brand of philosophizing (and emphatically not someone else's!). The *Gorgias* is thus on one level aimed at de-authorizing Isocrates' hybrid of rhetorical-philosophy, and puts in its place Plato's mathematics-philosophy cocktail.

VARIATIONS ON A THEME: THE MEANINGS OF PHILOSOPHY

Across fourth century Greece, philosophers began to define their philosophical projects in literary publications like Isocrates' *Against the Sophists* or the *Gorgias* well enough to form distinct schools of thought. The word "philosophy" predated any standardized definition, and Isocrates' school, which by our standards was a school of rhetoric, bore the name philosophy. Take as a point of reference that the differences between Plato and Isocrates are unlike differences between the Empiricists and the Rationalists of modern philosophy in that the locus which encompassed the ancient Greeks' understanding of what constituted philosophy was much wider and less definitely drawn. Where Descartes and Locke held different views on the basis of knowledge, Isocrates, Plato, and the other philosophers of the fourth century disagreed on the entire focus of philosophy, with each thinker calling philosophy that which seemed to amount to "loving wisdom," the etymological meaning of the Greek *philosophia*. In 390 BCE, scholars observe an only half-completed turn of the philosophical kaleidoscope, an era in which philosophy bears much in common with the earlier pre-Socratic tradition, and whose shapes and colors are still too blurry to be explained under the sharper, crisper distinctions extant in later philosophy.

As Marina McCoy notes in a recent book, "The meaning of the term 'philosopher' and 'sophist' are disputed at the time Plato is writing; for Plato, the claim that Socrates is a philosopher rather than a sophist is normative rather than merely a descriptive claim."[20] Indeed, Socrates, Plato's philosopher par excellence, is described as a sophist in a work by the orator Aeschines (Timarch 173). That later tradition ossified Plato's robust formulation of what was a sophist as paragon, to the complete exclusion of other competing understandings of the word—some of which applied the term to Plato—obscures the fact that, although Plato, Isocrates, and many of their ilk tried, no one had the authority to use the term so normatively. What is clear is that, in a time when the word philosophy produced fuzzy pictures in the minds of Athenians, our intellectuals wrought in the image of their own beliefs unequivocal definitions for the word, and claimed to teach it in their schools.

Scholars must take care in considering fourth century philosophy. As Bloch observes in *What is History?*, "If the sciences were obliged to find a new meaning each time they made an advance, what a multitude of christenings!"[21] Our understanding of the word "philosophy," and inevitably of "mathematics," is informed by a rich, twenty-five hundred year tradition. The requirements which today lead to the conferment of the doctorate in philosophy bears little resemblance to the antique practice which furnished its name. This is a moment in history when philosophy still lacks a standardized definition, but rather, has a multitude of meanings specific to the schools which claimed to teach it. Our task is to carefully scrape away the past two and a half millennia and to recreate, to the best of our abilities, the atmosphere of fourth century philosophy. If we were to go to the gates of the Academy or Isocrates' school, who would be there? What would philosophizing look like? What would these students be doing?[22] These are the questions that drive this inquiry, and in order to answer them, scholars must allow images of cloistered monks, Descartes, and Locke to dissolve, and to bind our understanding of philosophy by a locus of toga-wearing, sharp-and-sassy Athenian intellectuals.

The players are two major Athenian thinkers, Isocrates and Plato. As we have seen, both thinkers laid the claim to teach philosophy, yet both held mutually exclusive understandings of the word.

For Isocrates, an esteemed orator, whose school was opened in 390 BCE, the study of philosophy sought to cre-

ate statesmen who could govern Athens well.[23] In his *Antidosis*, Isocrates recalls how he paid his dues as an Athenian philosopher, appropriately advising the Athenians when their democracy was overtaken (15.58), navigating the complex relationships between the Greek city-states during the Second Athenian Confederacy (15.66), and creating competent statesmen for the city through his philosophical school (15.158). The political craft was the central concern of his philosophy, and he abhorred the impractical arts which distracted the politicians (15.184, 266-7; 13.7; 12.26-30).[24] Indeed, McCoy emphasizes the practical dimensions of Isocrates' thought:

> Isocrates is not only a leading competitor of Plato's in offering a distinct kind of moral education. He is also a competitor for the very title of philosopher and repeatedly makes normative claims about the nature of philosophy, which he associates with his own rhetorical practice.[25]

By contrast, Plato maintains that the goal of philosophy is the pursuit of abstract truths out of a love for Truth itself, and Plato's image of philosophy is far less pragmatic than his competitor's. Plato's attraction to the highly logical and abstract undergirds his belief that the study of theoretical geometry is integral to apprehending truth, "and he argues that the more a method of investigation depends on mathematics, the closer it comes to the truth."[26]

In Book VI of *The Republic*, when Plato describes the chain of ascent from falsehood to Truth (the Allegory of the Divided Line), mathematical knowledge (*dianoia*) is the prerequisite knowledge for knowledge of the true Forms (*noēsis*) (509d-531e).[27] A book later, when Socrates determines how best to educate the citizens of the Kallipolis, he recommends an intensive program of the geometric arts, opining that mathematics alone can make men love the Truth (521c-531c).[28] Both the schools of Plato and Isocrates opposed an amorphous group of men known as the sophists, men who deployed trenchant oratorical abilities to persuade the masses, although both schools held different conceptions of who was a sophist. Indeed, labeling a competitor a sophist was a chief means of upending opposing conception of "philosophy."[29] Both writers view Gorgias as the fountainhead of sophistry, both condemn him to varying degrees in their works, and both distance their philosophical projects from the sophist.[30]

Despite their differences, it is important to emphasize a definitive similarity between Isocrates and Plato: both had grown up during a time of great turmoil in Athens, and both were intent on creating ethical government leaders who could stabilize the city. Isocratic philosophy was fundamentally a by-product of the Athenian society that made the man. Athens was a direct democracy in which the citizens (property-owning males) made decisions by popular vote; at the *omphalos* of Athenian government was the Assembly. All citizens were entitled to attend and participate in the Assembly, whose agendas were set by the comparably less open Council of 500.[31] Yunis notes:

> This collective political activity, undertaken on [this scale], represents a huge investment of time and energy by individual citizens, but it was essentially anonymous and undirected. The Athenian democracy could not and did not function, let alone prosper, without effective leadership.[32]

The most eminent leaders of the Assembly were not elected officials, but rather, men who could speak impressively enough to influence and persuade the men around them. Given that speakers who gave unethical advice—most notably Alcibiades—resulted in the loss of the Peloponnesian War and two temporary overthrows of the Athenian democracy, philosophers sought both to determine the best form of government and to prevent unethical people from destroying it.

Isocrates' aim was to create men who would make a functional democracy; his school set out to produce ethical speakers. Plato, by contrast, went further—he advocated for a monarchic government in which power was centralized in a single or, depending on which dialogue you are reading, small group of guardians. These guardians learned the requisite ethics by studying geometry. Mathematics was therefore brought to the center stage of the disciplining phenomena—as the rising contender for rhetoric as the requisite study for political leaders—and

accordingly was defined with a level of clarity unanticipated in Greece prior to Plato's lifetime.[33] Where Isocrates molded a philosophical outlook to the contours of the Athenian democracy,[34] Plato envisioned a new approach to philosophy, removed from the alleged ills of rhetoric and democracy, emphasizing an admittedly monarchial government, the guardians of which were educated extensively not in rhetoric, but rather, in mathematics (Rep. VII 521c-531c).[35] The two thinkers partake in a deep dialogue about the political applications of philosophy and the need to fix the city's governance. The easiest way for Plato to delegitimize the Isocratic model of philosophy, which Plato saw as dangerous and counterintuitive to effective governance, was therefore to pull it out of the ground by its root: to illustrate the problems with rhetoric and its aversion to Plato's self-acclaimed superior philosophy.

But how does a philosopher persuade a reader that his wisdom is better than a competing philosopher's? Timmerman and Shiappa have addressed the means by which a writer legitimizes his own conception of his discipline by analyzing the author's "terms of arts," or the consciously-chosen words an author uses to describe his craft, stating,

"Although the same phenomenon is being denoted, there is no question that using one name rather than another can evoke quite different attitudes and responses."[36]

In an earlier, landmark article, Schiappa argued that, in his *Gorgias*, Plato created the word rhetoric (*rhētorikē*) and imbued it with a negative connotation, observing that, "If Plato could identify the product of Isocrates—training [in rhetoric] as something unnecessary or undesirable, so much the better for the reputation of his school."[37] If Plato and Isocrates both laid claim to the word philosophy, Plato's tactic for monopolizing the word was to create a new word for Isocratic philosophy, to connect it with Isocratic education, and to make Isocratic philosophy seem like a bad thing so that Plato's looked better by contrast. [38] I contend that Plato not only uses the *Gorgias* to demarcate a rhetorical craft distinct from philosophy, but also uses the dialogue to reflect a definition of philosophy which was inextricable from geometry.

That we observe Isocrates deploying the same approach to de-authorizing Platonic philosophy makes the likelihood of this interpretation only stronger. Alexander Nehamas notes:

> Isocrates puts into a single category both 'those who are skilled in contentious arguments and teachers of geometry, astronomy, and other scientific subjects...He urges his listeners to an overwhelmingly practical direction, and considers the mathematical...training advocated by Plato a hindrance.[39]

Plato, Isocrates charges, is a descendant of the Eristics, a school of sophistry whose penchant for argumentation and refutation could have easily been confused with Socratic *elenchus* in the fourth century. Isocrates' love of the practical holds no respect for Plato's theoretical mathematics, and he is sure to mention their inutility to the Greek intelligentsia reading his works, contemplating study at his school (15.266-7).

As every mud-slinger wants to avoid being doused with mud, so both Plato and Isocrates are at pains to avert the accusation of sophistry. Sophistry is a particularly damaging word in the sense that it delegitimizes the fountainhead of a particular school, and puts at risk his ability to promote his own conception of philosophy. There is no shortage of instances where our authors refute the slightest inkling that they are in any way sophistic.

Analyzing such moments can be edifying, in so far as rebuffing a label like sophistry implicitly points the reader to a more nuanced understanding of what Plato and Isocrates thought was important when defending their philosophies. Most illuminating is the passage on misology (the hatred of logic) in the *Phaedo* (89d-91c), where Plato demarcates forwardly the relationship between sophistry and philosophy. The difference between the two, simply enough, is that the former lacks craft (*aneu technēs*), where the latter does not. Nahamas asserts that:

> arguing with craft (*technē*) ... lends to the discovery of true and secure argument and the realization that the world is ultimately stable because it depends on and

ISOCRATES, 436 TO 338 BC. ANCIENT GREEK RHETORICIAN, ONE OF THE TEN ATTIC ORATORS. FROM CRABB'S HISTORICAL DICTIONARY PUBLISHED 1825.

manifests the Forms—the real, unchanging nature of things. Once again, dialectic and the theory of the Forms connected to one another.[40]

The obvious question remains: Upon what craft is philosophy hinged?

Plato's word choices in the *Gorgias* are instructive. Gorgias' craft is defined, nearly ninety times, as rhetoric (*rhētorikē*).[41] Plato was a prolific user and inventor of the –ikē root, an affixly, which allows the author to make abstract nouns to describe the "art of" something (e.g. *rhētor* means "orator" in Greek, *rhētorikē* means "the art of the orator").[42] Since the -ikē root describes the "art of" something, it is particularly useful to survey Plato's use of the word in order to gauge what he considered to be the underpinnings of philosophy. If we trust Schiappa when he argues that Plato set out to create a vocabulary that could distinguish Isocratean philosophy from his own, we reasonably might wonder whether there is a parallel word in the *Gorgias*, another –ikos word, which could furnish for us the philosopher's *technē*, as Plato sees it.[43]

Such a word, "things geometrical" or "talented in geometry" (*geōmetrikos*), appears at both 450d and 508a in the *Gorgias*. The first shows that geometry is a legitimate craft where rhetoric is not. The other appears at precisely the moment when Socrates begins his defense of the philosophical life, which implicitly requires him to define for his counterparts what he believes philosophy to be (Rsp 458a, 511a,).

Plato thus interwove the study of geometry with the practice of philosophizing. But geometry, like philosophy, lacked a concrete meaning at the onset of the fourth century. Consider how Plato took the word geometry (*geōmetria*), which like philosophy was indefinetely defined before Plato's writing career.

GEOMETRY AS A PLATONIC TERM OF ART

Plutarch, a first century A.D. philosopher and historian, tells a story in which an oracle has come in to Delos enjoining its inhabitants to build a cube-shaped temple double in volume to the one already existing. Flummoxed, the islanders ask Plato what the oracle means. He responds that due to their intemperance, the gods have urged the islanders towards the moralizing study of mathematics. Plato tells some of his students at the Academy to solve the problem—known to the ancients as the doubling of the area of a cube.[44] Wanting to meet the needs of the islanders quickly, the students solve it using strings (the way mathematicians, so far as we can tell, solved problems prior to the fourth century).[45] Reducing geometry to mechanical devices, Plato charges, "[destroys utterly and corrupts] the good of geometry, geometry again falling back to sense perception."[46] Plato's students had gotten correct answers for the problem, but they did not practice geometry the way he saw fit: free of strings and wholly dependent on logic.

How faithfully Plutarch narrated this episode, we will never know. But Plutarch does point out no less than four salient features of Plato's mathematics: Plato's geometry 1) was done without the material tools common to the field, 2) was oriented towards logical reasoning, 3) reflected an aversion to physicality characteristic of his written philosophy, and 4) resisted other, albeit more traditional, approaches to doing mathematics. Plato upholds that the logical, mental dimension of geometry supersedes the deployment of physical tools to solve problems.

Plato, who undergirds his definition of philosophy with the study of mathematics, mutually reinforces philosophy and geometry by inextricably binding them in a single definition. By the accident of transmission, it is easy to believe that Plato represents accurately the climate of fourth century mathematics.[47] Without proper reflection, one might accept Plato as a barometer of what the term geometry meant to any Greek, considering that a fifth of the uses of the Greek word for geometry in the Greek corpus come from Plato and his commentators.[48] But in fact, Plato's definition of geometry serves his own specific philosophical ends and does not reflect a universally accepted definition of the term.

Searching through the *Thesaurus Linguae Graecae*, a database of the entire Greek corpus, it is possible to trace the history of word geometry (*geōmetria*) and its uses, both prior to and during Plato's lifetime. Early history of Greek mathematical history depends on the fragmented testimonia which survive from our early Greek authors. Historians accept that they are in effect arguing interpretations of early Greek thought from silence—as many works have been lost. As a result, scholars must proceed with caution and resist the temptation to extrapolate from the evidence that stands. Although no cogent narrative reveals concretely to us what Greeks made of mathematics prior to Plato, there are certain patterns which emerge. Two of the most salient include the ideas that geometry is practical and that it is something which sophists study.[49]

Herodotus, an ancient historian, reflects the opinion that geometry is fundamentally pragmatic, and locates the origin of geometry in Egyptian land-mensuration techniques

"Herodotus, an ancient historian, reflects the opinion that geometry is fundamentally pragmatic, and locates the origin of geometry in Egyptian land-mensuration techniques (II.109), reflecting the etymological meaning of geometry: 'measures of the earth.'"

(II.109), reflecting the etymological meaning of geometry: "measures of the earth." Further, we hear of the accomplishments of some geometers, including sophistic figures like Antiphon and Hippias. References to Antiphon the Sophist's proof that one can square the area of a circle by exhausting its segments (Arist.Ph.185a14) are recorded, but are treated with disdain by Aristotle, the post-Platonic writer recording it, because Antiphon relied on the material tools which Plato abhorred.[50] Plato's own characterization of the sophist Hippias (one of the few attestations of this thinker) emphasizes his attachment to geometric tools (Prt. 318e).

That the study of geometry seems more associable in the fifth century with sophists like Antiphon and Hippias than with philosophy is echoed by Aristophanes, who never shied away from making the Greek intellectuals the butt of his jokes. The famed comedian offers perhaps the richest depiction of geometers before Plato. In *The Birds*, Aristophanes writes of a bumbling geometer, Meton, who carries (and drops, to comedic effect) his myriad measuring instruments, and his foolishness is instructive. Recent scholars have argued that the scene with Meton comports with

Aristophanes' larger satire of the Greek intellegentsia.[51] Accordingly, as much as Aristophanes' critique of Socratic philosophy in *The Clouds* became a prevailing opinion of philosophy, which Plato would need to challenge to retain legitimacy (Ap. 18c-d), so much he would have to overturn the ridiculous view of geometers presented by Aristophanes. Aristophanes treats the pursuit of geometry similarly to that of philosophy: a comic endeavor which in form resembles the scientific discoveries that, in the fifth century, were subject to skepticism. Plato removed from geometry the physical devices which were the butt of Aristophanes' humor, and he elevated the study to near supernatural status.

Plato's mathematics, as expressed in his dialogue, is neither sophistic nor practical.[52] Plato, throughout his corpus, advocates for a new approach to mathematics, one whose divine ends and immaterial approach was unanticipated in Greek culture prior to the philosopher's lifetime. Plato used his dialogues to promote and develop new shape for Greek geometry, and his frequent deployment of words like geometry (*geōmetrikos*) and number (*arithmos*)[53] in his writings reflect the fact that "[describing new ideas with concrete nouns] creates the impression that the 'thing' has been 'out there' all along, waiting to be discovered and described."[54] It is a tactic which implicitly authorizes the author to put forth a non-standard definition of something and make it seem authorized. Before Plato's lifetime, geometry was a loosely defined endeavor which was, on the one hand, topical enough to be the subject of plays and deserving of intellectual's time, but the exact practice, its methodologies and theoretical underpinnings were largely negotiable on the other. After Plato, geometry was a full-fledged discipline, with clearly defined parameters, and a modus operandi which emphasized geometry's transcendent, logical power in place of the deployment of material devices.

The word geometry is used less than forty times over the two hundred year stretch before the beginning of Plato's writing career.[55] By contrast, Plato uses the geometr- root more than fifty-six times in his own corpus, not even taking into account the words he invented to describe geometry. He the first author to use the word for "things geometrical" (*geōmetrikos*), and as Timmerman and Schiappa note, creating a new word through the addition of the -ikos affix suggests directly that an author is developing a disciplining vocabulary.[56] Much ink has been spilled on the fact that Plato deployed the –ikos root in the *Gorgias* to create a word for the oratorical art, *rhētorikē*. But what of his creation of the word geōmetrikos in the very same dialogue? As much as Plato wanted to create a vocabulary for the un-philosophical aims of his rhetorical foes in 390, so much he was out to elevate the geometer as the model to which philosophers should aspire.

Plato's discussion of mathematics is bent on creating a distinct identity for geometry. Plato polices the boundaries of "acceptable and unacceptable" mathematics when he writes of mathematical *paideia* for the youths in the Laws. Plato asserts that Greek children should learn as much geometry as their Egyptian counterparts by playing mathematical games that confuse the study with play. The next step, Plato would have it, is to clear away the certain type of ignorance, by means of study in weights and measures, implicit in all men who touch lines (Lg.819a-e). Re-emphasizing the importance of mathematical education, Plato molds the word geometry to fit his own particular beliefs: it is free of physicality, completely logical, and—like philosophy—ought to be practiced willingly. In this sense, theoretical geometry mirrors the pursuit of philosophy in that both aim at truth: geometry, the truth of proportions, and philosophy the more arcane truths of metaphysics. Geometry becomes a metaphor by which the unenlightened philosopher can come to understand philosophy, whose aims are too esoteric to be understood by the non-philosopher.

In his presentation of the sophist Gorgias, Plato uses his rigidly defined geometry to contrast the objectives of his philosophy from Gorgias', who preceded Plato by nearly a century, and from Isocrates', with whom Plato's Academy actively competed in the fourth century. By labeling the two latter thinkers as math-less sophists, Plato elevates his own project and legitimizes his own definition of philosophy while simultaneously upending that of his foes.

CRITIQUING ISOCRATES THROUGH GORGIAS

No doubt Plato works tirelessly both to brand his philosophy and to create a distinct identity for the mathematics which would serve as its requisite study. But that's only half the battle. Plato's philosophy was markedly less pragmatic than Isocrates', which was fitted to the democracy it served. In 390 BCE, at the onset of his career, Plato needed not only to lay down the law on what mathematics meant to him and its role in philosophical inquiry, but he also needed to tear down the prevailing rhetorical underpinnings which dominated philosophy in his day.[57]

Early in the dialogue, Socrates bids Gorgias to reveal what he believes his craft, rhetoric, entails. When Gorgias' orotund answers fail to propitiate Socrates, the philosopher claims that one must consider a few legitimate crafts, namely geometry and astronomy, two focal points of Platonic education for statesmen (Grg 451b-c). Indeed both fields require speeches; one must be persuaded that one and one equals two. But unlike rhetoric, which is also rooted in guesswork, these activities utilize knowledge (*gnosis*). As we will see, Socrates' charge that rhetoric is such guesswork is an intentionally bastardized definition, which Plato culled and reworded from Isocrates' *Against the Sophists*. The passage, relatively short, reveals the partisan tensions simmering beneath the word *philosophia* in fourth century Greece, with the prevailing, rhetorical conception of Isocrates on the one hand, the new mathematical approach of Plato on the other.

Plato's critique of geometry-less education in the *Gorgias* is meant to critique Isocrates' program of education, whose panoply of subjects did not include mathematics.[58] Nails says that "the *Gorgias* made the perfect college brochure, contrasting Socratic oral methods with three successively less reputable characters."[59] Critiquing Isocrates implicitly links Isocrates to a sophistic antecedent, sophistry being what the latter attempted to distance himself from in works like *Against the Sophists*. In the *Gorgias*, Plato essentially re-emphasizes the very sophistic underpinnings which Isocrates fought against.[60]

At the opening of his school in 390 BCE, Isocrates published his tract *Against the Sophists*, likely serving as his own brochure for Isocratean education, whose intent, among many, was of distancing Isocrates from the sophists whom he eschewed throughout his literary career. That Plato can characterize Isocrates' antecedent as sophistic would have been vexingly counterproductive to Isocrates' intentions. Indeed Plato, in the *Gorgias*, mocks how Isocrates defined the aims of his school in *Against the Sophists*. Isocrates writes "[The philosophical arts] require much care, and are the task of manly and idea-filled minds" (17).[61] Plato directly satirizes this claim in the *Gorgias* when Socrates tells Callicles and Gorgias how he conceives of rhetoric (bear in mind that Plato created the word "rhetoric" (*rhētorikē*) in this dialogue to describe the oratorical *technē* and contrast it to philosophy).[62] Socrates claims, "It seems to me, Gorgias, to be a non-technical pursuit, but rather, one of the manly and guess-prone mind."[63] Here, Socrates puns on Isocrates' use of the word *doxsastikēs*, which means "idea-filled" or "creative," reviving the word's more obsolete meaning, "conjectural." The pastiche takes advantage of this ambiguity, and uses the less certain *stochastikēs*, which simply means "guesswork." Plato emphasizes that Gorgias' beliefs, and Isocrates' by association, are undergirded by faith in the argument from probability,[64] and casts these markedly sophistic underpinnings on Isocrates' own school. By contrast, Plato emphasizes that his own philosophy is founded upon the assuredness of geometry, which, as he will later confirm in *The Republic*, teaches men to appreciate the stability of truth (VII 525b). Isocrates is an illegitimate philosopher by the association with the sophistic Gorgias that Socrates seems to draw effortlessly.

The *Gorgias* is full of such episodes in which Socrates emphasizes how geometric education supersedes mere rhetorical training, the latter being the specialty of Isocrates' school. Plato is at pains to clearly distinguish the geometer's dialectical methods from the rhetorician's, and early in the dialogue, Socrates engages the prolix and parried responses of Gorgias and Polus, enjoining them to deploy the pithy and logical exposition of the geometers (465b). The latter labels his opponents uneducated by pointing out their lack of focus in speech, and more importantly, elevates geometric language as the substratum upon which true philosophers enact dialectic.[65]

One recalls that both Isocrates' and Plato's schools set out to create statesmen.[66] That Callicles, the obstreperous politician with whom Socrates battles for nearly half the dialogue, resembles Gorgias conveys the sophists' ability to spread their corruptive doctrine to posterity. Convincing a reader that Isocrates' school is sophistic and produces such men is a form of Platonic propaganda which allows Plato to delegitimize the alleged aims of Isocrates' project by association. Suggesting that orators can only create statesmen like the opprobrious Callicles delegitimizes Isocratic values and leaves room for Plato to define his own school.

Plato characterizes Callicles as a student of Gorgias with respect to his language, his beliefs, and his mathematical ignorance. No doubt the rococo speech of Callicles resembles Gorgias' prose: both are littered with balanced clauses, poetic language littered throughout with polyptoton, a literary device in which words of the same semantic root are repeated in quick succession.[67] Consider the following passage from Gorgias's *Encomium of Helen:*

> Φέρε δὴ πρὸς ἄλλον ἀπ› ἄλλου μεταστῶ λόγον. αἱ γὰρ ἔνθεοι διὰ λόγων ἐπῳδαὶ ἐπαγαγοὶ ἡδονῆς, ἀπαγωγοὶ λύπης γίγονται· συγγιγομένη γὰρ τῇ δόξῃ τῆς ψυχῆς ἡ δύναμις τῆς ἐπῳδῆς ἔθελξε καὶ ἔπεισε καὶ μετέστησεν αὐτὴν γοητείᾳ.
>
> *So let me move from one speech to another. Divinely inspired incantations are bringers of pleasure and reducers of sorrow. For coupled with the belief of the mind, the power of the chant bewitched, persuaded, and moved by its enchantment (10).*

Notice how this excerpt from Callicles' speech in Plato's *Gorgias* mirrors the historical Gorgias' prose:

> πρὸς αὐτοὺς οὖν καὶ τὸ αὐτοῖς συμφέρον τούς τε νόμους τίθενται καὶ τοὺς ἐπαίνους ἐπαινοῦσιν καὶ τοὺς ψόγους ψέγουσιν: ἐκφοβοῦντες τοὺς ἐρρωμενεστέρους τῶν ἀνθρώπων καὶ δυνατοὺς ὄντας πλέον ἔχειν, ἵνα μὴ αὐτῶν πλέον ἔχωσιν, λέγουσιν ὡς αἰσχρὸν καὶ ἄδικον τὸ πλεονεκτεῖν, καὶ τοῦτό ἐστιν τὸ ἀδικεῖν, τὸ πλέον τῶν ἄλλων ζητεῖν ἔχειν:
>
> *They lay down laws for themselves with respect to their own advantage, praising and censuring. They frighten the mightier and those able to have more so that they will no longer have more than they, claiming that overreaching is shameful and unjust, and that seeking to have more than others is unjust (483c).*

Through Callicles' language, Plato is able to link Callicles to Gorgias, effectively allowing the reader to read Callicles as both a politician and a product of Gorgias' rhetorical school.

Moreover, both Gorgias and Callicles espouse a general mistrust of the philosopher. In the *Encomium of Helen*, Gorgias charges that the philosophers manipulate reason (*logos*), persuasively contorting the soul and rendering the credibility of opinions null (12-13). Callicles follows suit, claiming that Socrates' pursuit of philosophy has left his soul bent out of shape like an ignorant school-boy's; worse still, Callicles claims that Socrates contributes nothing to the public good, instead delegitimizing any argument he comes upon (485e-486a). Such assertions, which run steadily through Socrates and Callicles' parley, betray the latter's gorgianic underpinnings. As much as we read the *Gorgias* as a critique of the man himself, so much we must interpret the *Gorgias* as a critique of sophistic education, which as we will see, Plato is keen to associate with Isocrates.

Socrates does not answer Callicles' reproach of the philosophical life until the end of the dialogue, when Callicles' perfunctory responses to Socrates' questions bid the latter to abandon the discourse (506b).[68] Socrates does not censure the sophists with whom Callicles allegedly accords, but rather, inveighs against Callicles' education in general, and his neglect of geometry in particular (508a):

> The wise men, Callicles, tell us that upon Heaven and Earth both the Gods and men are bound by communion, friendship, propriety, temperance and justice... You seem, to me, to not have paid attention to these things, in all of your wisdom,...that geometric equality both among gods and among men is most powerful.

> You believe that men ought to train in greediness, because you neglect geometry.[69]

Geometry binds equally the gods and men and is a link through which men might make contact with the divine, while honoring geometric equality cannot be removed from submitting to the Good, which makes men good rulers (R. 525d-e). Geometry is the metaphor which symbolizes man's ability to apprehend truth. Implicit in Plato's choice dismissal of Callicles' education over against the particulars of the latter's argument is the notion that geometrically-undergirded education would not create a corrupt politician like Callicles, whereas geometry-less *paideia* does and did.

One also notes Plato's choice use of the expression "geometric equality."[70] If this expression sounds esoteric, it is supposed to. Dodds defines this term as

> The equality of ratios found in what is still called a geometric progression...In the fourth century, [the mathematical contrast between geometrical and arithmetic progressions] was given a political application, and "geometric equality" was said to represent the true principle of distributive justice.[71]

If geometry is the metaphor upon which the arcane practices of true philosophy are made knowable, then Callicles does not grasp it. Plato tells his readers, which in the fourth century included potential students for his Academy, that a lack of geometric training produces men who cannot understand the most essential knowledge of statesmanship: Justice. Further, the geometry-less do not even recognize its name: geometric equality.

The effect is likewise replicated in another of Plato's dialogues, the *Meno*, whose titlular character is also a student of Gorgias (Men. 70c). The dialogue questions the nature of virtue and puffs up geometric education while simultaneously pointing out Meno's own faults. When Meno cannot produce a sufficient answer to Socrates' questions about whether virtue can be taught, Meno retorts with a paradox: it is impossible for men to inquire what he knows, and equally so for things he does not (80d). Socrates is not impressed, and answers in a tale (*mythos*), in which all knowledge is maintained through memory, which itself is eternally written upon the soul. To prove this beyond a doubt, Socrates' calls over one of Meno's slaves, and after drawing some lines in the sand, the slave is able to double the area of the square with no prior geometric training (84a-e).

"Plato tells his readers, which in the fourth century included potential students for his Academy, that a lack of geometric training produces men who cannot understand the most essential knowledge of statesmanship: Justice."

If we trust Meno when he says that Gorgias made all the men in Thessaly hunger for wisdom (70b-c), Socrates was intent on revealing Meno's starvation. When Meno abandons his Gorgianic education, instead begging Socrates to demonstrate himself how he would approach their questions about virtue, Socrates locates Meno's problem in his lack of self-awareness. Unlike his opponent, Socrates claims that he understands the nature of hypothesis, intimately bound to the geometric dialectic Socrates prefers, and points out Meno's own lack of geometrical training:

> But Meno, you do not even try to control yourself…Unless you could loosen up a bit and permit the question at hand to be engaged through hypothesis…I mean by this how geometers solve questions posed to them (86d-e).[72]

The fact that the very virtues Gorgias is claimed to uphold in the beginning of the Meno—letting others question him and always furnishing a suitable answer (70c)—are repeatedly indicated to be Gorgias' weak points by Socrates' caviling, betrays Gorgias' ignorance.[73] That Gorgias' students are time and again reproached for their lack of geometric education leaves one wondering the value of an education that does not teach geometry, one which could not match Socrates' geometry-laden wit, which furnishes for him the sophist-crushing, logical capacity of hypothesis. The effect is damning, but what does Gorgias, who is long dead by the time Plato publishes his dialogues, have to lose from Plato's criticism? It is Isocrates, teaching rhetoric on the other side of Athens in 390 BCE, who loses the important things by being associated with math-less Gorgias: legitimacy, money, and the power to standardize his own definition of philosophy over Plato's pro-geometric conception. Characters like Gorgias and Meno show what philosophy looks like when it is not undergirded by the geometer's methods, and serve both to discursively define everything Plato is not and to delegitimize everything that Isocrates held himself up to be.

Later in his career, Isocrates would feel the burn of Plato and his Academy more vocally. In his *Oration to Philip*, he makes a passing reference to a group of Eristics (likely Aristotle and others among Plato's progeny, not to be confused with the earlier, pugnacious group of philosophers to whom both Plato and Isocrates refer in their career) who have slandered his name. Answering their calumny, he remarks that geometry, astronomy, and the Eristic dialogues which the youths have taken up, despite their inutility, keep the young from crime and dangerous hobbies (24-7). Likewise, in his apologetic *Antidosis*, Isocrates echoes these thoughts on the pursuit of mathematics and its place in rearing philosophers (266-7):

> I do not find it fit to call "philosophy" this [geometrical study] which is no help in the present and does not help one to speak or fare well…I would then advise the youths to pass some time on these studies, but not however to waste away like skeletons on them.[74]

Plato's reproach of non-geometrical education certainly did not go under Isocrates' radar, and his later works met Plato's censure with Isocrates' own rebuke of pro-geometric education.

CONCLUSION

The emergence of a written culture in the late fifth century allowed intellectuals to define their projects, and to delegitimize those of their enemies, by publishing literature. We observe the Greek intelligentsia creating a new vocabulary with words like rhetoric, (*rhetorikē*) and geometrical craft (*geōmetrikos*) to describe their nascent disciplines, which still lacked concrete parameters in the fourth century. The central thesis of this article is that Plato, as an actor in the disciplining phenomenon, dovetails two terms of art, philosophy and geometry, to both define his own project and to de-authorize his leading competitor, Isocrates, whose geometry-less conception of philosophy was antithetical to Plato's and a reflection of the social norms of a rhetorically-heavy democracy against which Plato fought. By linking Isocrates to a sophistic antecedent like Gorgias, Plato both inveighs against competing modes of education and marks Isocrates' school the creator of fools, Plato's the creator of philosophers.

NOTES

1 Heath 1931: 172.

2 Timmerman 1998: 146.

3 Kahn 1996: 35-60.

4 Kahn 2003: 143.

5 Yunis 2003: 2. Kahn 2003: 141.

6 Havelock 1982: 201-2. See Yunis 2003: 7-9 for a review of Havelock's instrumental role in twentieth century scholarship, and his shortcomings.

7 Yunis 2003: 6

8 Dean-Jones 2003: 97-120.

9 Yunis 2003: 196-203.

10 Kahn 2010: 139-61.

11 Lloyd 2003:130-1.

12 Timmerman & Schiappa: 2010: 17-66.

13 Wilder 1981: 161.

14Too 2008: 15. "Isocrates' mode of self-fashioning is eccentric... Isocrates' marked resistance to contemporary rhetoric and its culture is what paradoxically fashions him as a master of rhetorical discourse in the fourth century."

15 Too 2008: 15. "Isocrates' mode of self-fashioning is eccentric...Isocrates' marked resistance to contemporary rhetoric and its culture is what paradoxically fashions him as a master of rhetorical discourse in the fourth century."

16 Schofield 2002: 48-50.

17 Heath 1931: 171.

18 Fowler 1988: 107.

19 Rabinowitz 1977:127.

20 McCoy 2010: 3.

21 Bloch 1992: 17-8.

22 Lloyd 2003: 122.

23 Nails 2003: 178-80.

24 Too 2008: 54: "What Isocrates means by 'philosophy' is skill at using language, i.e. rhetorical ability, such that an individual can function for the good of his society; nowhere does he use the word 'rhetoric.' Isocrotean philosophy does not involve a pursuit of abstract and precise knowledge which hinders one's capacity to serve his state. See Plato, *Phaedrus* 27810b-1 or Socrates' ironic quip that there is by nature 'some philosophy' in Isocrates' mind."

25 McCoy 2010: 8-9.

26 Nehamas 1990:4.

27 There is no singular scholarly consensus on how to interpret the divided line allegory. I follow Moors 1984: 148, who writes, "It is highly problematic, given the manner of its portrayal, that the line is intended to produce any single sub-section which is to be regarded as self-sufficient. Each of the four sub sections identified bears fundamental connections with others, resulting in a whole image which must be approached with a view to a statement on knowledge." The connection, I assume, is one of graduating levels of increasingly truer expressions of Truth.

28 Fowler 1987: 107.

29 Plato likens Isocrates to a sophist, as we will see, in the *Euthydemus* (304c-307c) and *Phaedrus* (279a-e). Isocrates references Plato's followers, whom he labels as Eristics (a sophistic group, which is the subject of the *Euthydemus*) in his *Oration to Philip* (24-7). See also Nehamas 1990:15, who argues that in Isocrates' *Helen* (1), we find an irrefutable jab at Plato.

30 Nails 2002: 156-8.

31 Yunis 1996: 1-7.

32 Yunis 1996: 9.

33 One must restrain from speculating, but one notes that mathematicians deployed by monarchs to create geometry textbooks, whose use would ostensibly be to educate the

monarch, recurs numerously in Greek mathematical historiography. See Fowler 1988: 200-312.

34 Kahn 2003: 139

35 Fowler 1998: 107 summarizes Platonic education for the guardians: "The curriculum is proposed as part of the education of the future guardians of the state; it will occupy men from age twenty (537b-c) to thirty (537d). It will be preceded by earlier training in childhood, imparted through play (536d-e)...only those who show promise will go on to study mathematics. At age thirty, after a second selection, the students will pass on to training in dialectic."

36 Timmerman & Schiappa 2010: 5.

37 Schiappa 1990: 465.

38 Timmerman 1998: 146 notes that, although Isocrates' school taught rhetoric, Isocrates nonetheless considered it a school of philosophy.

39 Nehamas 1990: 4.

40 Nehamas 1990: 12.

41 Schiappa 1990: 464.

42 Schiappa 1990: 464.

43 Schiappa 1990: 457-70.

44 Heath 1981: 244-255.

45 Heath 1981: 77.

46 We hear of the Delos oracle in Plutarch's *De E apud Delphos* (8.2, 718E-F). Plato's censure of his students is told in another work, *Quaestiones convivales* (8.2.1). I have collated these two sources to give a singular account of the Delian affair. The Greek for Plato's quote is: "ἀπόλλυσθαι γὰρ οὕτω καὶ διαφθείρεσθαι τὸ γεωμετρίας ἀγαθὸν αὖθις ἐπὶ τὰ αἰσθητὰ παλινδρομούσης." All translations of the Greek in this paper are my own.

47 Rihil 2002: 1-20 .

48 Netz 2002: 209.

49 Lloyd 2003: 130 sheds light on the nature of our sources. "While written texts are attested from Anaxmander onward, it is well-known that when they were consulted, they were more often read out and discussed than studied privately and in silence." Our corpus is markedly incomplete, but I posit that Plato still marks a distinct moment where mathematics entered into written discourse, and following trends in the studies of disciplining (Havelock 1983), this allows for a sort of literate revolution in the field. Judging by Xenophon (Mem.4.2.8), much of this literature was technical in nature; a far cry from the logical expositions we find in Plato.

50 Heath 1986:271-3.

51 Amati 2010 contends "Meton's scene is significant not only to the plot of *The Birds* but to Aristophanes pervasive satire of intellectuals." (214).

52 It is outside the scope of this article to consider Euclid. But Lloyd 2003: 134 is enlightening. "The treatises in the Euclidean corpus, not least the *Elements* itself, represent one extreme end of the spectrum from the point of view of impersonality. Euclid himself does not just not obtrude: he is invisible, and his life and character are unknown quantities. Nothing, we must say, could be further from rhetoric and rhetorical self-advertisement than mathematics." Euclid consciously links his findings to the Academics, i.e. the attribution of the definition of commensurability to Eudoxus (V.V.) Further studies may detect a conscious attempt on Euclid's part to carry on what he perceives to be the Academic tradition. This is certainly the opinion of Proclus (Cmtry. Euc. 68-70).

53 There is no concrete way to define the word "*arithmos*" in Plato. It is a main ingredient in a complicated and nuanced body of research which charts the development of number theory in Plato; see Fowler 1988: 16 for a quick treatment. I will add that Greek culture saw numbers differently from modern readers. Fowler 1988: 14 argues,

"Greek mathematics makes free use of the cardinal numbers; but rather than our thinking of the sequence 1,2,3..., qua cardinals, a much more faithful sense of the Greek *arithmoi* is given by the sequence: duet, trio, quartet, quintet."

54 Weaver 1985: 125.

55 Two things must be taken into account here. Some of these forty uses are testimonia from Plato's own corpus, which I have not deducted from this number. I have dismissed testimonia like Fragment 11 of Thales, in which the use of "geometry" refers to Eudemus' history, ("Thales is said in Euthydemus' history of geometry...") written well after Plato died.

56 See Timmerman & Schiappa 2010: 10-15.

57 Too 2008: 99 "Callicles objection to philosophy at *Gorgias* 484c8 ff. (with note in Dodds (1959), 272-3) suggests that Isocrates' understanding of 'philosophy' may be a more mainstream one than Plato's. The verb φιλοσοφέω is first employed by Herodotus to describe Solon's geographical investigations (1.30.2)."

58 Johnson 1959: 26 notes that "[Isocrates'] curriculum was certainly ill-defined, with broad limits. But one thing is clear: he taught not mathematics."

59 Nails, Debra 1995: 214.

60 Yunis 1996: 117-71.

61 ταῦτα δὲ πολλῆς ἐπιμελείας δεῖσθαι καὶ ψυχῆς ἀνδρικῆς καὶ δοξαστικῆς ἔργον εἶναι,

62 Timmerman & Schiapa: 2010: 10.

63 οκεῖ τοίνυν μοι, ὦ Γοργία, εἶναί τι ἐπιτήδευμα τεχνικὸν μὲν οὔ, ψυχῆς δὲ στοχαστικῆς καὶ ἀνδρείας.

64 Gagarin 2007: 27-36 .

65 Timmerman & Schiappa 2010.

66 Haskins 2004:130.

67 Demos 1994: 90.

68 Cf. 458d when Callicles says "I am unsure that I was ever so delighted as now; for my part, let us continue the discussion, even if it takes the whole day."

69 σὺ δέ μοι δοκεῖς οὐ προσέχειν τὸν νοῦν τούτοις, καὶ ταῦτα σοφὸς ὤν, ἀλλὰ λέληθέν σε ὅτι ἡ ἰσότης ἡ γεωμετρικὴ καὶ ἐν θεοῖς καὶ ἐν ἀνθρώποις μέγα δύναται, σὺ δὲ πλεονεξίαν οἴει δεῖν ἀσκεῖν: γεωμετρίας γὰρ ἀμελεῖς..

70 The mathematical analogy, and Plato's belief that it was in fact Pythagorean in origin, is worked out by Aristotle in the *Nichomachean Ethics* (1131b12) and the *Politics* (1301b29). Cf. Republic 558c, where democracy is described as an anarchic olio "assigning equality likewise to equal and unlike" (ἰσότητά τινα ὁμοίως ἴσοις τε καὶ ἀνίσοις διανέμουσα).

71 Dodds 1959: 339.

72 ἐπειδὴ δὲ σὺ σαυτοῦ μὲν οὐδ' ἐπιχειρεῖς ἄρχειν . . . εἰ μή τι οὖν ἀλλὰ σμικρόν γέ μοι τῆς ἀρχῆς χάλασον, καὶ συγχώρησον ἐξ ὑποθέσεως αὐτὸ σκοπεῖσθαι, εἴτε διδακτόν ἐστιν εἴτε ὁπωσοῦν. λέγω δὲ τὸ ἐξ ὑποθέσεως ὧδε, ὥσπερ οἱ γεωμέτραι πολλάκις σκοποῦνται.

73 ἅτε καὶ αὐτὸς παρέχων αὑτὸν ἐρωτᾶν τῶν Ἑλλήνων τῷ βουλομένῳ ὅτι ἄν τις βούληται, καὶ οὐδενὶ ὅτῳ οὐκ ἀποκρινόμενος.

74 φιλοσοφίαν μὲν οὖν οὐκ οἶμαι δεῖν προσαγορεύειν τὴν μηδὲν ἐν τῷ παρόντι μήτε πρὸς τὸ λέγειν μήτε πρὸς τὸ πράττειν ὠφελοῦσαν, διατρῖψαι μὲν οὖν περὶ τὰς παιδείας ταύτας χρόνον τινὰ συμβουλεύσαιμ' ἄν τοῖς νεωτέροις, μὴ μέντοι περιιδεῖν τὴν αὑτῶν κατασκελετευθεῖσαν ἐπὶ τούτοις.

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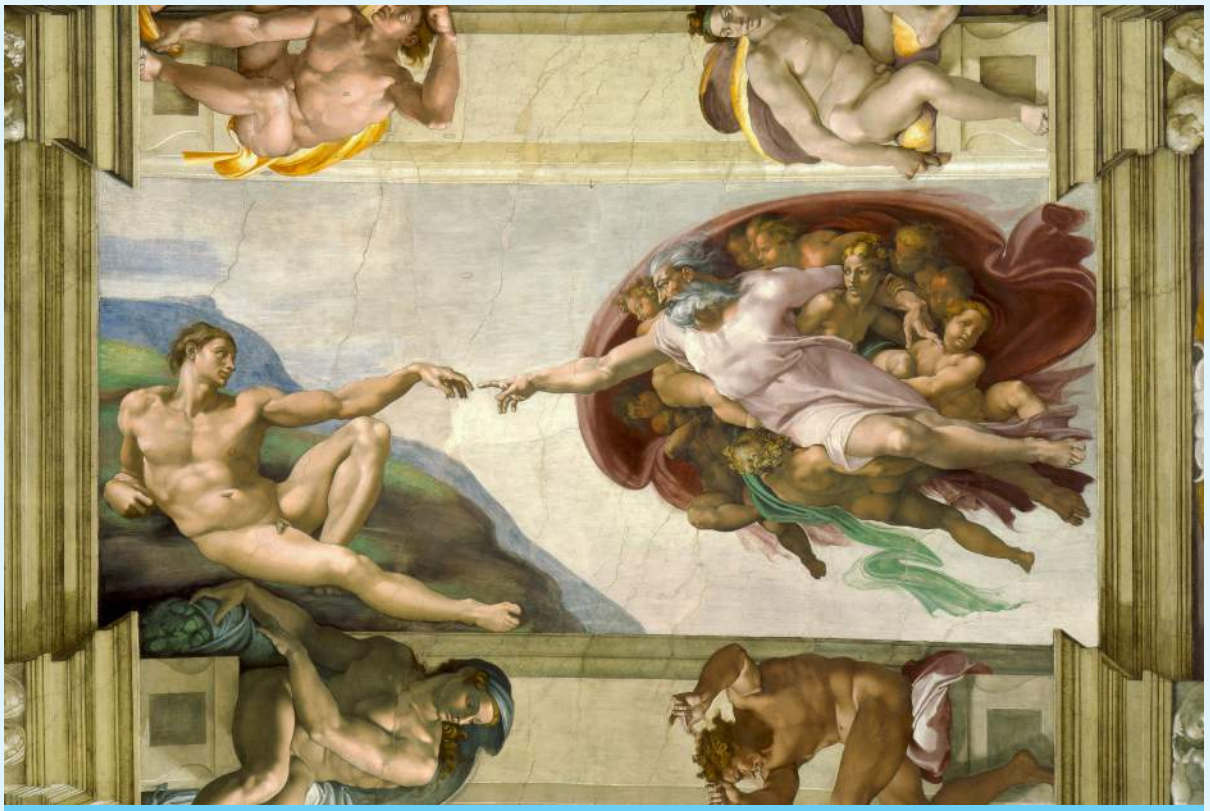
THE DALMATION HYPOTHESIS

Assessing the Relativity of Emotional Response to Art

PAUL BOBOC

THROUGH RECOURSE TO EMPIRICAL ANALYSES, NUMEROUS RESEARCHERS HAVE COME TO A VARIED SET OF CONCLUSIONS REGARDING THE NATURE OF HUMAN EMOTIONAL RESPONSE TO ART. J. PRINZ ARGUES THAT EMOTION AND APPRECIATION CO-OCCUR, AND THAT THE ROOT OF SUCH APPRECIATION AND EMOTION IS ULTIMATELY NEUROBIOLOGICAL.[1] PROF. RAMACHANDRAN AND HIS COLLEAGUE, V.S. HERSTEIN, OFFER AN EVOLUTIONARY THEORY OF ARTISTIC APPRECIATION, WHILE P.J. SILVIA'S EVIDENCE IS BEHAVIORAL, PROPOSING THAT RESPONSE TO ART IS INDIVIDUAL AND IDIOSYNCRATIC TO EVERY OBSERVER.[2, 3] DUTCH PROFESSOR HAGTVEDT AND HIS COLLEAGUES PRODUCE EVIDENCE THAT THE MANNER IN WHICH SUBJECTS RESPOND TO ARTISTIC STIMULI IS DEPENDENT ON THEIR PRIOR VALUE SYSTEMS AND INDIVIDUAL ENVIRONMENTS.[4] EMOTIONAL RESPONSE TO ART AS A GENERALITY IS ROOTED IN EVOLUTIONARY NEUROBIOLOGICAL PROCESSES. NEVERTHELESS, THOUGH THE NEUROBIOLOGICAL NATURE OF SUCH APPRECIATION AND RESPONSE IS UNIVERSAL, THE ULTIMATE DECIDER OF HOW AND WHY A PERSON IS LIKELY TO RESPOND TO A PARTICULAR ARTWORK IN A PARTICULAR WAY STEMS ULTIMATELY FROM PERSONAL EXPERIENCE.



MICHELANGELO'S "THE CREATION OF ADAM," FOUND IN THE SISTINE CHAPEL

The nature of the aesthetic experience of art has undergone much study and has been documented and researched by various experimental psychologists, all of whom have attempted to prove particular hypotheses regarding the open-ended nature of such experience. The predominant problem in any such study—the question of why we respond emotionally to art in particular ways—is not distinctly or even predominantly a biological one, since it may be understood through the looking-glass of philosophy and philosophical psychology just as readily as it may be approached biologically or empirically.

A question inevitably crops up: why is it that when Subject A (an imaginary instance) is shown Michelangelo's painting of Adam's creation, he is perceived to emote intensely—his pupils change dimensions, his concentration augments considerably (as is observed by imaging of his cerebral processes), he feels a certain impulse and emotive strain tugging at his inwards, while Subject B, shown the same picture, likewise emotes, though in no sense with the same intensity as Subject A—Subject B's experience neither fully coincides with nor reiterates Subject A's apprehension of the stimulus. The explanation ultimately rests in the variety of human experience: whereas on a fundamental level both subjects are human and therefore likely to experience the same essential emotions— dictated by their common biological evolution and human identity—the experience of feeling particular emotions will diverge based on their situation and what that situation has taught them in regard to art and creation.

Researchers like Jesse Prinz make the claim that the appreciation of a work of art consists of an emotional response, and that this emotional response is grounded in

the neurobiology of the brain, Prinz's claim that there is a neurobiological basis for the aesthetic response to art is spun from empirical studies which he has examined thoroughly, as well as from philosophical inferences which he has found to correlate distinctly with the experimental findings he puts forth.[5] His former understanding of artistic appreciation—appreciation as understood through the lens of philosophical speculation—posits two distinct stages in the aesthetic response process: initial response and assessment, both of which he then examines in conjunction with neuroimages, which concur with the former inductions.

Prinz's studies are derived from prior analyses by intellectuals who took part in research to discover correlations between cerebral activity and the apprehension and viewing of art. Research is cited that has shown a relation between motor activity in the brain and the contemplation of artistic works—efficacious evidence that the viewing of art is an emotional process. Emotion in general, whether negative or positive, tied to external stimuli or to internal ramifications, gives rise to cerebral motor activity and therefore to physical movement as well.[6]

Other researchers have taken a similar route. Vilayanur Ramachandran displays rationales which posit that particular neural circuits of our brains have evolved, which allow us to perceive and enjoy art in an emotional manner, and that the neural processes which arise from the circuitry involved are the ultimate source of our emotional response to art.[7] In essence, artistic appreciation is reducible to evolutionary factors, and that artistic stimuli may excite particular areas in the brain with a potency equal or superior to natural stimuli.

The process of emotional response to art is a laborious and extended one, beginning with looking at a picture, which arouses early visual areas of the brain. The process continues to the input received by the eyes being sent to the inferotemporal cortex, which detects discernible objects. Upon recognition of the object and the emotional significance thereof, the amygdala relays the message to the autonomous nervous system, and this leads ultimately to a motor response in the subject: essentially a more complex vision of the same basic mechanism outlined by Prinz, which claims that art produces aroused motor efficiency in those who view it.[8] Ramachandran makes little distinction between the observation of an event of real life and the perception of an artwork: the same basic mechanisms are involved in each, and are dictated by laws of evolutionary biology, which he focuses on profoundly.

Ramachandran probes deeper than Prinz in the evolutionary respect. According to him, the brain has evolved to contain a limited number of attentional resources, and the various representations which it perceives vie for neural space. This hearkens back to the theory of Gombrich that we fill in incomplete series; Ramachandran agrees that, since the brain can only take in so many stimuli at a time, it must coordinate its powers to make sense of the objects it perceives. Therefore, he claims, when the brain tries to comprehend a work of art or a symbolic phenomenon, it looks for clues to object-like signals in the work which excite the limbic system and attract cerebral attention to that particular area.[9] It is the capacity to draw generalizations from particulars in art, and to see similarities in different aspects of a work of art in what he terms "successive distinct episodes," that leads the limbic system to activate, ensuring that the process of trying to comprehend a work of art is rewarding.[10] The example he provides is that of the Dalmatian dog hypothesis: several splotches on a canvas which faintly resemble a dog, if taken one by one, are per-

"One is likely to respond emotionally to a work of art in a manner determined principally by adaptive evolutionary traits that have evolved in humanity over innumerable millennia."

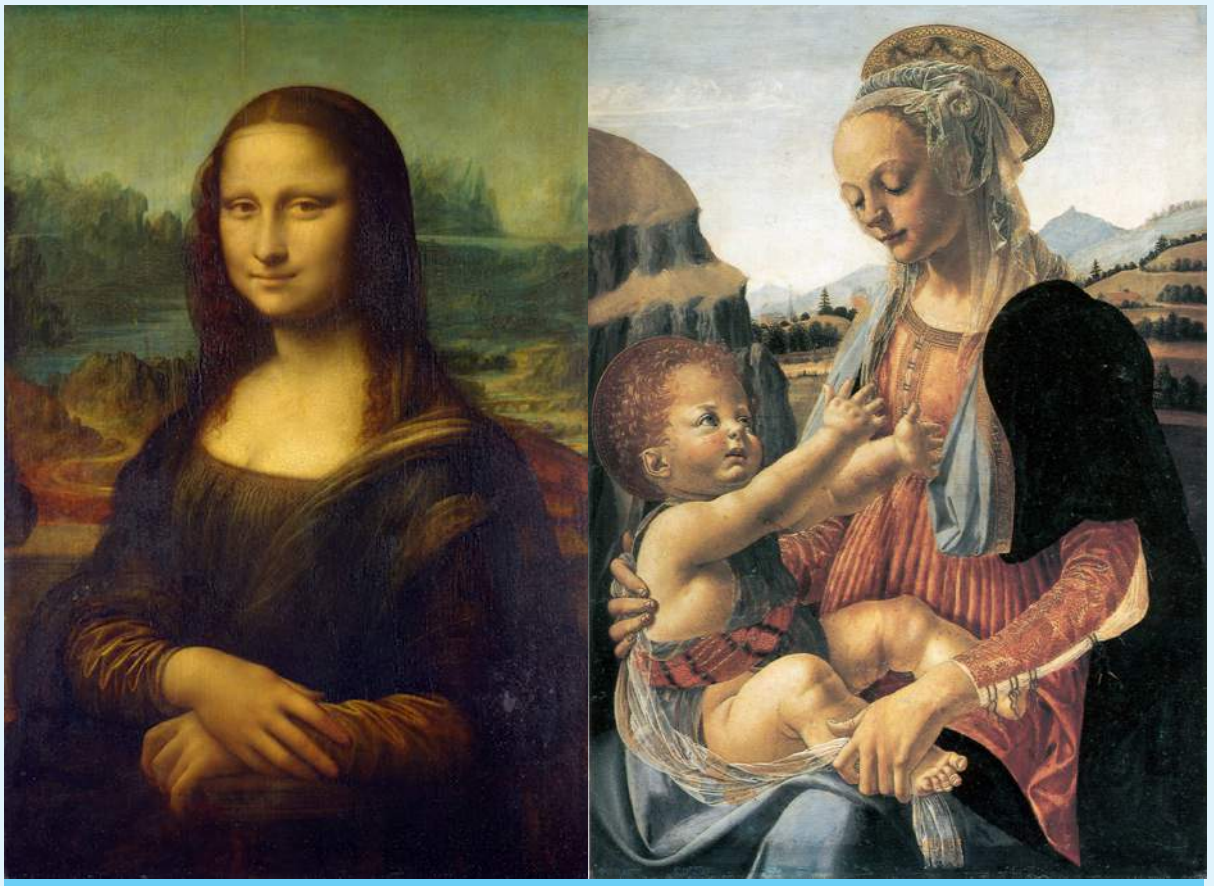
ceived merely as independent splotches, and the disorganized and incoherent nature of such a comprehension would be unlikely to arouse either intrinsic pleasure or intellectual satisfaction. The combination of such pleasure and satisfaction, claims Ramachandran, would result in a powerful aesthetic and emotional response. But upon visceral involvement, as the brain tries to make sense of the splotches in relation to what it knows and does not know, it eventually dawns on the viewer that the splotches represent a Dalmatian; upon realizing that the picture in question is a Dalmatian, the viewer feels inherently happy for having solved a pressing dilemma, and the activation of his or her limbic system ensures that the subject feels a positive emotional response.[11]

The reason for this ultimately lies in evolutionary psychology, according to Ramachandran. It results from the fact that grouping things into collectives and discerning general ideas from particular representations is an inherently valuable trait in the fight for survival, and this trait has carried into the realm of artistic interpretation as well; the same concept holds for the appreciation of art as for that of real life.[12] Therefore, when we look at a painting of a terrifying tiger, our brains perceive it as a tiger within an instant, and Ramachandran would argue that emotional response to such a painting would be one of fear. Likewise, an abstract or Surreal painting of a tiger, which would not depict a tiger per se but rather something faintly resembling a tiger, would be perceived by the brain as something embodying the nature of tigerness, and the emotional response to such a painting would likewise be one of moderate fear. Such a fear would hardly be marked enough to manifest itself somatically, but would exist nonetheless, given the brain's propensity to categorize and attribute general features to particular entities. Therefore, says Ramachandran, one is likely to respond emotionally to a work of art in a manner determined principally by adaptive evolutionary traits that have evolved in humanity over innumerable millennia.

Yet the neurobiological evolutionary thesis fails to explain the broad nature of human response to art entirely, leaving little room for the self-evident idiosyncrasies of individual artistic perception. The empirical studies already outlined define the emotional nature of artistic perception as wholly, or very nearly wholly, impersonal: the general phenomenon of artistic stimuli arousing cerebral functions which in turn produce a response to the stimuli, as determined by evolution. Such an understanding of emotional response to art hardly accounts for the enormous differences with which people interpret artistic productions, and only explains little in the way of such broad variations.

By turning to relativism, one gains a better understanding and appreciation of the issue than by sticking to the evolutionary model. Subjectivism and relativism in the emotional and aesthetic appreciation of art have been shown to be immensely important role-players in the nature of people's emotional responses to art. People who are generally unemotional or less given to shows of strong emotion have been measured to be less likely to appreciate a painting aesthetically than individuals who are more emotionally inclined, proving a drastic variation in aesthetic preferences even within close groups.[13] Such variations have been shown to exist on a grander level within differing cultural settings; while Easterners prefer scenes that encompass more things, Westerners are more intent on depicting individual settings and focal individuals. Likewise, Africans tend to appreciate art which principal quality is that of brightness, an attribute which many African artists and laymen find highly appealing.[14]

According to Prinz, aesthetic appraisal, though in itself relative, consists of a generalized initial response stage and of an assessment stage. The former is largely due to cultural beliefs (the Mona Lisa was viewed by the Renaissance critic Vasari as a beautiful woman, while the Romantics mystified her into a mystical exemplar of feminine mystery); the latter is considered in light of personal aesthetic values, prompting us to ask such questions as: "is the work original?"[15] Hagtvedt also claims that this is the principal question we ask ourselves (usually on a subconscious level) when viewing a work of art, along with: "Is it created with technical skill?"[16] In essence, it may be argued that we admire the *Mona Lisa* not merely because it's a fine painting, but predominantly because da Vinci painted it. If we were to find out that the painting was really painted by Ver-



THE *MONA LISA* BY DA VINCI AND *MADONNA WITH CHILD* BY VEROCCHIO

rocchio, the *Mona Lisa* would wane its prestige and our admiration wanes proportionally.

Prinz's model essentially posits a form of aesthetic appraisal in which positive emotional response constitutes appreciation. He goes on to consider three intriguing possibilities for what precisely that positive emotional response might inherently be. His first proposes that it is a biologically basic emotion dedicated to aesthetic evaluation.[17] This is by and large the road that Ramachandran would take in tackling the issue, but such an explanation fails to persuade Prinz, who claims that there is an inherent difference between the purely aesthetically pleasing and the purely attractive. The two often do not correlate in art; much of Picasso and Dubbefet holds little value in the way of attractiveness, but as aesthetic manufactures they are unquestionably of a superior character. That we have evolved traits to enjoy the purely aesthetic—traits that allow us to enjoy art for art's sake—is likewise improbable, since art is very recent and fails to contribute to the propagation of the species.[18] His other theory is that a work of art arouses many various emotions in the beholder, a notion discarded because it fails to account for the fact that certain artworks are naturally preferable to us than others; some sort of emotional uniformity must exist.[19] Ultimately, the attribute that most associates art to aesthetic response, according to Prinz, is wonder, which he classifies as a largely spontaneous manifestation (when it takes hold of individuals), a sociocultural construct that has evolved out of biological rudimentaries over time. For example, I am likely

to be spontaneously overwhelmed by wonderment and positive affirmation when perusing an intricate Caravaggio, but a Zulu might think such a painting blasphemous or inexcusably strange. Prinz provides no empirical evidence for the claim that wonder is of prime importance in aesthetic appreciation, arriving to the conclusion through a series of affirmations and negations of various other positions he puts forth, the principal ones having been summed up in brief.[20]

Evidence supporting Prinz's quasi-anthropological theory has been provided by Paul Silvia, who, though employing slightly different terminology, arrives at similar conclusions, namely that emotional response to art is dependent on the degree of interest exhibited by the viewer, and that this interest is tied to the degree of appraisal that a given work of art is likely to elicit from a viewer (he does not go so far as to use wonder as the basis of his position, but it may be argued that wonder is merely interest augmented beyond a certain threshold, and so the same thing in essence).[21] Silvia claims that novices are far less likely to look at highly abstract or complex pieces of artwork for extended periods of time. This is because their threshold of appreciation differs from the experts'. From the evidence presented, it becomes apparent that experts were able to understand artwork better than novices. This evidence is founded on a series of tests in which subjects of varying propensities in artistic interpretation were shown simple and complex works and asked to appraise them based on the emotions the pieces elicited from them. The highly trained among the subjects were those likelier to say that they enjoyed and admired both the simpler and the more complex paintings, while the lesser-educated admired the simpler paintings less and the complex paintings substantially less than the trained individuals.[22] Other research shows that individuals are able to enjoy works of art to a greater extent if they know the titles of pieces than if they are left in the dark concerning the titles; from the composite summations of these findings, it stands to reason that the degree to which one understands a work of art is directly correlated to the degree that one enjoys the art. The empirical data offers irrefutable proof that this is the case, though the given facts make one emerge with the position that it is a mixture of the rational element, which is conscious, and the irrational element of wonder, both of which are sociocultural constructs to a marked extent.

"The collective response to art can be surprisingly similar and mechanical, the result of an instinctive excitement derived from seeing the color red."

This position is firmly supported by Professor Henrik Hagtvedt and several other researchers, who agree that one's emotional response to a piece of art and the appraisal elicited from art is to some degree dependent upon one's critical capacity. According to Hagtvedt, pleasurable emotions that the object arouses influence the opinion on the aesthetics, and this ultimately leads to one's considering an artwork as either thought provoking and interesting or unoriginal and tedious.[23]

Appraisal theory as espoused by Silvia in his work is supported by the research of Professor Pieter Desmet and his colleagues, who are involved in marketing strategies and specialize in emotional design. According to the literature, appraisal theory posits that the arousal of a particular appraisal (an appraisal being an evaluation of a given situation) elicits certain emotions commonly identified as being related to the appraisal in question.[24] Situations appraised as consistent and pleasurable are classified as good, while those that are appraised as incoherent or chaotic are classified as negative; to a large extent, therefore, the emotional response to a piece of art is by and large dependent on the particular appraisal patterns of each individual, taking one back to the relativistic claims of Prinz: what the African tribesman appraises as beautiful and meaningful is ultimately different than what the European or the Japanese regards as lovely.[25] Therefore, when particular motives are taken into account, any objective effort

to systematize or universalize the general abstract appraisal patterns fails.[26]

It has likewise been suggested by Denise Sumpf that artworks are projection fields for emotion, and that emotions are elicited by works of art relative to the personal biographies of people.[27] A study has demonstrated that biography mediates one's aptitude to attach or distance oneself from a work of art: a subject in a particular study which aimed to discover what causes people to be drawn to art was strongly attached to the artist Andrej von Jawlenevsky merely because she grew up in the same town.

Perhaps one of the most exhaustive empirical studies to date was done as an analysis in the nature of the individual of artistic preferences. Edward Vessel and Nava Rubin conducted an experiment in which they showed 96 abstract images in six sets of 16 each, using various software techniques, which were shown to test subjects on computer displays.[28] The observers all had good vision and were of approximately 26 years of age at the mean. The test subjects, 35 in all, were shown two sets of images—one of the two sets were abstract images, while the other was composed of real-world images of familiar everyday objects. When the block of sixteen abstract images flashed on the screen, they were made to choose whether they liked the preceding image less or more by clicking on a left arrow key and a right arrow key, respectively. The process was repeated six times until 96 abstract images were flashed on the screen, and the process was repeated with real-world images as well. The result was interesting: the real-world images generally attracted more agreement among the test subjects in terms of aesthetic preference, while there was more randomness and individualism in taste when it came to abstract images. The explanation of the experimenters was that humans are more likely to make semantic connections between objects which they comprehend from real-world experience: this holds equally true for art, where flowers will be seen as beautiful generally. But with abstract imagery, where meaning is not so easily discernible, appreciation is more haphazard and random. This experiment, while not definitive, demonstrates that artistic appreciation and response is in large part environmentally pre-conditioned, resulting from the meanings we are likely to perceive in art and its real-world reflection.

Yet things are not quite so simple. Alan Manning and Nicole Amare have performed a similar experiment to the one conducted by Vessel and Rubin. They set out to analyze the manner in which humans are variously impacted by different colors in works of art.[29] Several subjects were involved in this experiment (the precise number is not mentioned in the study). The experimenters chose figures that sampled a range of form possibilities while sampling the color-range as well (variety vs. contrast vs. pattern and red-range vs. green-range vs. blue-range color, respectively). Their aim was to see if similar colors and forms evoked similar emotions; they showed their test subjects several different abstract pictures and gave them a word bank of 12 words, out of which they were instructed to pick out the three words that best correlated to the pictures they were shown. Among these words were agitated, stimulated, attracted, and diverted. To a large extent, the researchers found that people tend to agree among each other as to what particular images signify: for the image that was principally red, most said agitated-stimulated-diverted or a combination thereof, while none said rested or focused. This study showed that, although it is true that the appreciation of a work of art is largely based on the semantics of individual meaning, our collective response to art can be surprisingly similar and mechanical, the result of an instinctive excitement derived from seeing the color red, or a calming effect from seeing the color blue. This is logical: most things that are red or reddish in the world—blood, fire, lava—are dangerous to us or signs of possible danger, so we have grown to instinctively be excited by everything red. Yet if this applies to art also, the incapacity we have to judge a predominantly red painting or computer image as peaceful or calming would take away from the individual free will we have in judging art. Which raises the question: how individual is the perception of art?

What, ultimately, is the nature of emotional response to art? Why do we respond to art emotionally in the first place, given that art is merely illusion and has no survival properties of intrinsic worth whatsoever? From a perusal of literature on the subject, I conclude that there is no uni-

versal way of answering the question. That we respond emotionally and behaviorally to art is beyond a doubt; empirical studies—both from brain scans and questionnaire examinations—yield evidence that humans are deeply and profoundly influenced by art, which, as revealed by studies and re-enforced by common sense, affects the brain and consciousness in a potent way. Yet such explanations fail in lieu of the myriad ways in which people interpret art, and the evolutionary thesis is shaky at best, seeing as art is a relatively modern invention and holds no self-evident survival merit. I conclude, ultimately, that the emotional process elicited by works of art is a relative one, which varies from person to person to such a remarkably broad extent; and that, being relative, it is dependent on various experiential traits which themselves are largely shaped by cultural and personal factors. This theory is supported by some researchers, but by no means by all. Several, like Ramachandran, would take an all-out evolutionary approach, saying that there is fundamentally no freedom in the choice of how we are likely to respond to a given work of art. It boils down to the neurobiological explanation being able to elucidate emotional responses to art—courtesy of fMRI scans and other articles which have shed light on the cerebral processes which make artistic appreciation and emotional receptivity to art possible—while cultural and sociological factors also determine how we respond to art. Evolutionary factors drive us in a certain direction, making us more likely to appreciate blue or light images than hellish red ones. I would, in any case, argue for the primacy of the latter; in the process of determining whether I like Caravaggio or Hakusai, I find myself influenced more by my personal history and the cultural conditions that formed my views than on intrinsically evolutionary or biological mechanisms. But in the end it appears that neither position is wholly correct, and the best response may lie somewhere in the mean.

ENDNOTES

1 Prinz, 2007
2 Ramachandran & Herstein, 1999
3 Silvia, 2005
4 Hagtvedt et. al, 2008
5 Prinz
6 Prinz
7 Ramachandran & Herstein
8 Ramachandran & Herstein
9 Ramachandran & Herstein
10 Ramachandran & Herstein
11 Ramachandran & Herstein
12 Ramachandran & Herstein
13 Prinz
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16 Hagtvedt
17 Prinz
18 Prinz
19 Prinz
20 Prinz
21 Silvia
22 Silvia
23 Hagtvedt
24 Desmet
25 Desmet
26 Desmet
27 Sumpf
28 Vessel and Rubin
29 Manning and Amare

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DIAGNOSING PERSONALITY

Analyzing Aggression and Developmental Pathways in Disruptive Behavior Disorders

SCOTT GERON

OPPOSITIONAL DEFIANT DISORDER (ODD), CONDUCT DISORDER (CD), AND ANTI-SOCIAL PERSONALITY DISORDER (APD) ARE EXTERNALIZING PATHOLOGIES THAT APPEAR FROM CHILDHOOD TO LATE ADOLESCENCE WITH DISTURBING CONSEQUENCES FOR BOTH THE PATIENT AND THOSE IN THEIR SURROUNDING ENVIRONMENT. THIS LITERATURE REVIEW IS AN ANALYSIS OF THE HIERARCHICAL PROGRESSION OF THESE EXTERNALIZING PATHOLOGIES, INCLUDING A RANGE OF DETAILS ON EACH DISORDER'S SYMPTOMS, A COMPARISON BETWEEN THESE SYMPTOMS, AND AN EXPLORATION OF THE CRITERIA REQUIRED FOR DIAGNOSIS. IN ADDITION, THE PRESENCE OF PATHOLOGICAL AGGRESSION IS ANALYZED IN ODD, CD, AND ADP, AS ARE THE DEVELOPMENTAL PATHWAYS AND ASSOCIATIONS BETWEEN THE THREE PATHOLOGIES. THE ARTICLE ALSO PRESENTS THE CURRENT CONTROVERSIES SURROUNDING THE ROLE OF AGGRESSION IN THE AFOREMENTIONED BEHAVIOR DISORDERS—A DEVELOPING SUBJECT THAT HAS BEEN RECENTLY EXPLORED AND CONTINUES TO BE STUDIED IN CONTEMPORARY PSYCHOLOGICAL RESEARCH.

Oppositional defiant disorder (ODD), conduct disorder (CD), and anti-social personality disorder (APD) are externalizing pathologies that manifest especially between childhood and late adolescence with alarming consequences for both the affected and those in their surrounding environment. The following article is a review of the hierarchical progression of these externalizing pathologies, including a full range of details on each of the three disorders' symptoms, the required criteria for diagnosis, and a comparison of symptoms between disorders. As an additional dimension of analysis, the specific role of pathological aggression will be explored as it is expressed in increasing severity from ODD to CD to APD. The nature of developmental pathways and the theorized associations from ODD to CD to APD merit careful examination and discussion. Both the roles of pathological aggression and of developmental pathways (tracing the mental disorder progression from ODD to CD to APD) are areas of emerging research in the field of psychology.

SYMPTOMATOLOGIES

According to the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV), characteristics of ODD follow a persistent pattern of "negativistic, defiant, disobedient, and hostile behavior toward authority figures."[1] Specific symptoms include losing one's temper, especially while arguing with adults. The individual affected may also deliberately annoy other people. This type of child or adolescent can be particularly difficult to parent, due to their blatant refusal to cooperate and obey their parents' parameters. Other symptoms include blaming others for their own mistakes, and belligerent behavior. Besides being touchy and easily annoyed, these individuals may also display anger, resentment, spitefulness, and vindictiveness. According to psychologists' analysis of the DSM-IV field trials, "'spiteful and vindictive' and 'angry and resentful' criteria [are] the two most consistent predictive symptoms of ODD...[and can] be viewed as defining the core features of the disorder."[2] Further, to reach a diagnosis for ODD, a diagnosis for other disorders (such as an adjustment disorder with a disturbance in behavior) must be absent.

To diagnose ODD, four behaviors out of those described must be observable for a period of at least six months, and must include symptoms "beyond that which [are] developmentally appropriate."[3] The requirement that ODD symptoms be deemed developmentally inappropriate is a key point which deserves particular emphasis.

At times, many children and adolescents are prone to argue and defy rules set by authorities. Patterns of opposition may be central to the normal cognitive and psychosocial developmental stages during adolescence. According to psychologist Peter Blos, disengagement from internalized objects (parental authority figures) is related to oppositional tendencies through the process of individuating as an adolescent:

> 'The physical separateness from the parent or the polarization with the past... often represent the only means by which the adolescent can maintain his psychological integrity during some critical stages of the individuation process,'[4] wherein 'such epiphenomena...always stand in opposition to the established order'.[5]

The important distinction between opposition in a regular child and adolescent opposition is that the diagnosis for ODD can only be met if the defiance is extreme and occurs without deviance for at least six months.

CD is a diagnosis that many psychologists associate with an escalation of ODD. Theorized developmental pathways attempt to describe the development from ODD to CD as a natural progression of the underlying mental disorder (ODD) to a more serious stage (CD).

The main characteristics of CD feature a series of persistent behaviors "in which the basic rights of others or major age-appropriate societal norms or rules are violated."[6] The impact on families, communities, and peers is generally more serious and wide-reaching compared to the symptoms observed in ODD, which are generally limited to the interactions between the mentally disordered individual and authority figures.

Symptoms of CD include descriptors of aggression towards people and animals.[7] An individual with CD may terrorize those in his environment. The affected individual may feel it is acceptable to engage in physical fights. Someone with CD may even steal from his or her victim, or force them into sexual activity. Compared to simply being argumentative (a symptom of ODD), these violent and confrontational displays of conduct-disordered aggression are more serious. Cruelty extends beyond the human realm, as those with CD may harm animals without remorse. An individual with CD may also partake in destruction of property. With humans, animals, and property as potential targets for destruction, CD symptoms are clearly more generalized and far-reaching in scope than the symptoms of ODD.

CD symptoms can be either overt (as discussed above) or covert. Covert symptoms include "concealed behaviors such as lying, stealing, and drug abuse."[8] Gender differences may be important in determining whether overt or covert aggressive symptamotology is displayed for conduct disorders. Due to gender socialization, girls are relationally more socially aggressive, whereas boys are more physically aggressive. Some psychologists claim that CD-affected girls experience a period of greater irritability before displaying aggression than boys, as "an accumulation of inhibited angry cognitions and emotions fuels a reservoir of angry emotions" before the behavior is externalized.[9] This phase of irritability is supported by a national representative sample of girls studied: "The majority of recurrently angry girls (88.8%) had gone through an earlier phase of highly irritable behavior."[10] Therefore, though boys may act more quickly on their aggression, girls are both more covert and experience greater periods of irritability before performing aggressive acts.

When considering gender differences, CD is more commonly associated with boys than with girls. According to one study, "boys have consistently been reported to be at greater risk of CD."[11] Statistics quantify the nature of the gender differences: "In a large, community-based sample, the rate of CD in girls was below 1% in childhood and ranged from 1.4–3.3% ... whereas for boys the rate ranged ... 3.2–5.4%."[12] Confirming this statistical trend, another study conducted through the Institute of Psychiatry at King's College in London finds "a sex ratio of only 1.5:1 for adolescence-onset delinquency" between males and females.[13] Therefore, while rates are similar across genders, males do comprise a slightly higher percentage of those affected with CD.

In order to satisfy a diagnosis of CD, according to the DMS-IV, only three of the above symptoms and behaviors need to be observed over time in the individual. Given the aforementioned symptoms, it is easy to understand how sufferers may experience "negative life events" such as "removal from the home, being held back in school, being disliked by peers [as] consequences of disruptive behavior."[14] In a typical school setting, for example, an individual with CD may be the school bully who threatens and intimidates classmates through physical confrontation.

APD has more serious symptoms than both ODD and CD. The DSM-IV notes the distinction in severity by the way the three behavior disorders are classified. ODD and CD are Axis I disorders in the DMV-IV, meaning they are clinical in nature, whereas ADP is Axis II.[15] The Axis classifications in the DSM-IV shows that ADP affects a person's personality in more serious, pervasive, and fundamental ways.

The specific symptoms for APD are outlined in the DSM-IV, and include a routine and repetitive pattern of "disregard for and violation of the rights of others occurring since age fifteen years."[16] A disregard for others can manifest itself as a failure to follow social norms and lawful behavior, leading to repeated acts that are "grounds for arrest."[17] It can be pleasurable for those with APD to be deceitful towards others. Impulsivity, recklessness, irresponsibility, and a general disregard for safety are important diagnostic cues for APD. Especially destructive symptoms include aggresion combined with a lack of remorse. Without guilt or a conscious sense of wrongdoing, aggressive actions can be performed with a sense of inner ease. Ted Bundy, the American serial killer who was sentenced to the death penalty for methodically killing over 30 people, is an example of a person with APD. In an interview, Bundy references his lack of guilt as an advantage in exe-

cuting his murders, stating, "Guilt doesn't solve anything, really...I am in the enviable position of not having to deal with guilt."[17] Statements such as this exemplify the lack of remorse that is common to sufferers of APD.

According to the DSM-IV, APD is found in 3% of males and 1% of females, with eighteen years of age being the minimum permitted age to diagnose APD.[18] It is rare that adolescents would be diagnosed under age twenty-one for a personality disorder. Usually, it is held that there is risk in assigning a personality disorder to a person below the age of twenty-one, "given the malleability of personality during development and the heterogeneity of antisocial youth."[19] However, the model of progression from ODD/CD to APD allows for a preliminary diagnosis to be made even at age eighteen. This is due to the predictive behaviors of these illnesses. For instance, it can be seen that a criterion for APD diagnosis necessitates "evidence of Conduct Disorder with onset before age fifteen years."[20]

The discussion of APD symptomology would not be complete without addressing criticism of the DSM-IV's criteria for the disorder. The symptoms described for ADP in the DSM-IV "focus on antisocial behaviors rather than personality traits central to traditional conceptions of psychopathy and to international criteria."[21] Therefore, while the DSM-IV emphasizes behavioral traits, the inclusion of more personal character traits could more accurately represent how APD sufferers feel. For instance, an underemphasized character trait in the DSM-IV diagnosis criteria for APD is callousness and a lack of empathy. While symptoms outlining "recklessness" and "disregard for safety" may suggest these character traits, they are not entirely as explicit.[22] The inclusion of these character traits may enhance the criteria's representative accuracy in the DSM-IV's evaluation of ADP.

ROLE OF AGGRESSION

Increasingly severe symptoms of pathological aggression have so far been described, from ODD to CD to ADP. A series of neurological research studies suggest a reason for this phenomenon.

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Biological factors specific to conduct-disordered youths may affect the expression of aggression in ODD, CD, and ADP symptomatologies. As seen in studies of animal behavior, altering chemistries of specific regions of the brain can have direct consequences on how aggression is enhanced.[23] Research of animal models show that altering sensory cues can lower or raise aggression behavior. For example, "in the rat, removal of the olfactory bulbs can induce predatory aggression."[24] Changes in sensory modalities and alterations in brain functioning can be biological triggers for aggression. This finding applies to individuals with disruptive behavior disorders, as the altered modalities in the brain may, in fact, be strong contributors to the expression of pathological aggression.

Specific findings regarding the relationship between brain chemistry and aggression levels were uncovered in an expansive study involving passive avoidance tasks. Passive avoidance tasks are those in which participants learn to respond to stimuli that reward. Conversely, participants in these tasks learn to refrain from stimuli that punish. In the process of conducting the passive avoidance tasks with conduct-disordered youths (and control groups), the participants had brain activity measured across regions such as "[the] amygdala, caudate, insula, and a network of regions implicated in attention processes, including the dorsolateral prefrontal cortex and parietal cortex."[25] Through functional magnetic resonance imaging (fMRI), it was found that in each of these regions "youths with a behavior disorder...showed significantly less activation than the comparison subjects."[26] Disrupted functioning of these specific brain regions has far-reaching implications in terms of aggression.

It is believed that the amygdala is central to the creation of "stimulus-reinforcement associations," which inform a

person which stimuli are preferable or not preferable.[27] As individuals with conduct disorders demonstrate "a deficient capability to learn to avoid the stimuli that predict punishment,"[28] this finding suggests that there is a "functional neural basis for why such youths are more likely to repeat disadvantageous decisions."[29] Without being able to perceive punishment, conduct-disordered youth have difficulty understanding the consequences of aggressive impulses. With deficient decision-making neural processes, the sufferer will therefore engage in aggression more readily and freely.

Other studies also demonstrate how neuroanatomy, neurochemistry, and neuroendocrinology can affect aggressive factors by enhancing aggression in disruptive behavior disorders. Fundamental psychological studies have shown that chemical predispositions for aggression are "high testosterone, high MAO-A, and low serotonin."[30] MAO-A is a biological predisposition for aggression that deserves emphasis. MAO-A (monoamine oxidase A), known as the warrior gene, is an enzyme found in humans that is created by the MAO-A gene. Dysfunctional MAO-A in mice has been positively correlated with socially disruptive behavior such as increased isolation and increased aggression.[31] In humans, recent studies have found statistically significant trends of people with low MAO-A activity being a "significant risk factor" for aggressive and antisocial behavior, especially for those individuals with low MAO-A who were abused in their childhood.[32]

Further, studies involving animals suggest, "multiple neurotransmitter systems are involved in the modulation of aggressive behavior...[including] serotonin, norepinephrine, dopamine, acetylocholine."[33] Specifically, 5HIAA (5-hydroxy indoleacetic acid, a cerebrospinal fluid measuring central serotonin) has been found through studies to be important to the expression of aggressive behavior in conduct-disordered adolescents, where the "measure of metabolite 5HIAA...was [at] a lower level in aggressive [conduct-disordered juveniles], particularly impulsively aggressive...conduct-disordered juveniles."[34] The findings of such biological studies state that the altered brain chemistry dampens the person's ability to perceive negative consequences. Simultaneously, the person experiences reduced control over aggressive tendencies. The combination of "deficits in self-control, lack of reflection and/or insensitivity to consequences can lead to unproved and disproportionate acts of physical aggression."[35] While biological factors enable aggression, the specific types of aggression actually enacted by ODD, CD, and APD suffers are classified in a unique category of pathology.

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The specific types of aggression seen in children and adolescents with disruptive behavior disorders (ODD, CD, APD) are "pathological forms of aggression."[36] Pathological aggression is maladaptive "in that it is triggered by minimal or non-apparent stimulation, utilizes an inappropriate excess of force, and is expressed at inappropriate targets."[37] Forms of pathological aggression "exceed the species-normative patterns [of aggression], often leading to intense harm and injury."[38] Pathological aggression encompasses both overt and covert behavior. Symptoms of conduct disorders can be cited as pathologically aggressive; animal cruelty is clearly aggression placed on inappropriate targets, while the reckless harm of others is a pathological excess of force. Because sufferers of APD do not have an accurate understanding of the relationships between self and others, there is a greater chance for aggression to be directed at inappropriate and undeserving targets.

For further insight onto the role of aggression in conduct disorders, one may consider conduct-disordered youths involved in cases of parental battering in which a child physically attacks a parent. Parental battering refers to "physically abused parents," who are regularly threatened, degraded, insulted, and physically attacked "by their children."[39] While this behavior is not common—and mainly based on case reports by psychologists—it represents a form of pathological aggression perpetrated by youth with conduct disorders and/or antisocial personality disorder.[40]

One psychologist comments that, "youths are reported to push their parents' bodies around like inanimate objects."[41] Another describes a patient with a gambling compulsion who, while demanding large sums of money, "threatened and beat his father and mother almost daily ... [and] during the beating, the son sometimes fell asleep, woke up, and continued the beating."[42] For this to occur, the parent(s) must be helpless to prevent the attacks.

Out of the reported cases of parental battering, a high percentage of aggressors were conduct-disordered adolescents:

> Parental battering is often associated with the adolescent's habituated pattern of violence...[on] a continued, progressive course...[a] high percentage of patients have displayed antisocial personality patterns.[43]

To further define the phenomenon, it must be noted that the violence against parents is different from "occasional aggressive outbursts against the parents commonly seen as an expression of the transient adolescent turmoil and separation conflict."[44] Instead, the parent (usually the mother) becomes "a permanent victim of habitual violence by a child."[45]

Factors such as "educational deficiencies in parents...lack of identifiable rules, lack of value orientations...lack of a positive father figure...physical weakness" in the parent-child interaction may be important for allowing conduct-disordered youths to engage in parental battering.[46] Having clear household rules, a father figure, and physically strong parents are important for providing order, security, and safety at home; these factors have the power to stop or correct disorderly behavior. The absence of these factors of security allows a conduct-disordered youth to more freely express uncontrolled aggression. Biologically, the weakness of the parent may even "escalate the perpetrator's savagery"; when predatory animals hunt prey, aggression rapidly escalates as the predator senses its prey's weakness and mounting "terror."[47]

The expressions of aggression exhibited by conduct-disordered youths can manifest in many different forms and across many different dimensions. The full scope of the pathological aggression of which these youths are capable is truly expansive. Surveying the destructive behaviors found in cases of parental battering, one can easily identify the basic elements of pathological aggression: there is an excess of force (insults and physical attack) against inappropriate targets (caregivers). Further, the nature of the violence suggests there is no clear stimulus that rationally explains the aggressive actions, as "aggressive acts are ill defined and are experienced as involuntary abreactions of inner tensions."[48] One can understand the role of callous and remorseless antisocial youth in this phenomenon who engage in this aggression. In fact, conduct-disordered youth in these cases are often motivated by "feeling [an] inside emptiness and boredom," which, in itself, "can trigger a new aggressive impulse."[49]

As illustrated through the phenomenon of parental battering, sufferers of ODD, CD, and APD are capable of exerting pathological aggression in a multitude of ways. Pathological aggression can even take the extreme form of serial killings, as observed in the example of Ted Bundy. The common elements across all forms of pathological aggression—violence against inappropriate targets, in excessive force, and triggered by non-apparent stimulation—shed insight into the minds of ODD, CD, and APD sufferers. Thus, the role of pathological aggression is central to understanding the nature of these destructive externalizing behaviors.

DEVELOPMENTAL PATHWAYS

Due in part to the symptomatic similarities of ODD, CD, and APD, it has been argued that there are strong links—progressive developmental pathways—between these disorders. Even the DSM–IV organizes disruptive behavior disorders "as if they reflect age-dependent expressions of the same underlying disorder."[50] The progressive developmental pathways are the subject of current scientific research and study.

Pathways are often referred to as the average time periods occurring between two behavior problems.[51] More specifically, a developmental pathway is defined as "the orderly behavioral development between more than two problem behaviors."[52] The pathways from ODD to CD to APD are classified into three groups with three to four stages each. These pathways structure symptoms from "innocuous to very serious," as dictated by an escalation model.[53] An escalation model attempts to describe the intensifying stages involved in the transformation from ODD to CD to APD.

One of the three possible developmental pathways, according to this escalation model, is called the Authority Conflict Pathway.[54] The first symptom in this pathway is stubbornness toward authorities, beginning before age twelve. As time progresses, the second stage in this pathway is referred to as the defiance/disobedience stage, which is marked by more intense reactions against authority figures such as ignoring all set rules and boundaries without fear of consequence. Ultimately, an individual following this pathway may reach the "authority avoidance" phase. This phase represents the sufferer's most extreme behaviors against authority figures. Common phenomena include "truancy, running away from home, and staying out late at night."[55]

The second pathway described is the Covert Pathway, which begins at age fifteen. The first stage along the Covert Pathway is characterized by "minor covert acts (shoplifting and frequent lying)." Over time, an individual may advance to the second stage of this pathway: the "property damage" stage, which is hallmarked by vandalism and sometimes arson. The third stage an individual reaches through this pathway is referred to as "moderate delinquency." At this level, a person feels comfortable committing fraud without remorse or guilt. The Covert Pathway includes a fourth stage, "serious delinquency," which encompasses behaviors of the most serious types of covert aggression (such as auto theft and burglary).

The third pathway is the Overt Pathway. It is characterized by physically aggressive behaviors, beginning with "minor aggression," and escalating to more dramatic behaviors with each stage. The second stage includes "physical fighting." Violence in the third stage is severe, encompassing "rape, attack, [and] strong arm."[56, 57]

By understanding the pathways described, the relationship between ODD and CD can be better understood. Research shows that "comorbidity between CD and ODD in childhood is undoubtedly strong. In clinical samples, rates of ODD in cases of CD have been reported to be as high as 96%."[58] However, these clinical samples are certainly higher than other samples, as "in general population samples...60% of CD cases typically meet full criteria for ODD."[59] In a larger study, participants would be more diverse. The difference between the clinical study and the general population study emphasizes an important question that is currently the subject of study: what is the chance that a person with ODD will then develop CD and/or APD? The difference in comorbidity rates found between studies (as seen in the difference between the clinical and general studies referenced) suggests that pathways

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are not entirely "deterministic (i.e., stipulate that a given individual will become violent later in life)."[60] In other words, not all ODD patients will develop CD or APD later in life.

According to several clinical and general population samples, "age trends...suggest that rates of CD diagnoses are low in childhood but rise steeply from late childhood/the early teens, whereas rates of ODD are relatively stable from early childhood to adolescence."[61] The distinct temporal difference between ODD and CD seems to support the idea that developmental pathways follow an "orderly behavioral development," linking CD development to prior ODD diagnosis.[62] The similarity of the symptoms and behaviors in the two disorders are often referenced as an explanation for the progression from ODD to CD. At this point, onset of CD is often predicted: "higher ODD symptoms predict an increase in CD symptoms in the following year."[63] However, it must be emphasized that despite strong associations of those with CD tracing their pathology originally from ODD, the majority of the ODD population will not progress to CD or APD.

In fact, recent evidence suggests that a link between ODD and CD may be less pronounced than once believed, and "quite limited...offer[ing] only mixed support for a developmental relationship."[64] Within the past few decades, a series of studies have been designed to "identify characteristics of children with ODD who do and do not go on to develop CD."[65] While the DSM-IV suggests that "when CD is present, ODD may be presumed to be present (APA, 1994)...studies based on community samples report higher proportions of youth with CD who do not have a history of ODD."[66] Therefore, this research suggests that "a developmental sequence from ODD to CD is pertinent only for a portion of cases of CD."[67] These findings doubt the presence of the developmental pathways from ODD to CD. Therefore, further research must, be conducted to assess the nature of the links between ODD to CD.

Regarding the CD to APD pathways, symptoms of CD have been strongly and directly tied to the development of APD. The pathways from CD to APD are more widely accepted, researched, and verified in the scientific community than the pathways from ODD to CD. According to an extensive number of studies conducted on samples of children and adolescents, "predictive studies have tended to support the ... developmental sequence: CD is a strong predictor of APD."[68] One factor that is important to consider is the age of onset. According to a large clinical study, involving "6,674 observations collected between age 9–16...[and] collected at ages 19 and twenty-one years,"[70] youth with CD "had significantly higher levels of APD symptoms than youth with no history of CD/ODD."[71] Therefore, the model of progression is reliable and predictive for developments of CD to APD.

In conclusion, this research has sought to define the symtomologies of ODD, CD, and APD. While each disorder is characterized by socially undesirable behavior (such as pathological aggression), the severity and scope of symptoms increases dramatically from ODD to CD to APD. While a sufferer of ODD may be resistant and stubborn toward authority figures, a sufferer of CD may feel comfortable defrauding people, destroying property, and harming animals. A sufferer of APD may feel no remorse or guilt engaging in physical confrontation (including pushing, strong arming, and rape) to satisfy aggressive impulses. The nature and type of aggression involved with these three disorders—pathological aggression—provides a greater understanding of the symptoms. The biological basis for this aggression involves altered brain chemistry (such as a reduced ability to process punishment), and this factor enables a CD sufferer to act on aggressive impulses without remorse. At the same time, a combination of environmental factors (such as the lack of a father figure and household rules) may also contribute to a conduct-disordered youth's expression of anger and destructive impulsivity. As observed in the situation of parental battering, the absence of the societal forces of security, constraint, and order (e.g., lack of rules) may encourage the conduct-disordered youth to more freely express their destructive impulses without the fear of restraint or being stopped. Finally, the developmental pathways between ODD, CD, and APD provide insight on the nature of hierarchical progression across the pathologies. While the link from ODD to CD has been both supported and doubted by different researchers in the psychological field (necessitating more

research to be conducted on the topic), the progression from severe CD to APD has been increasingly accepted as a fundamentally linked phenomenon.

ENDNOTES

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4. Blos (7)
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6. DSM-IV
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9. Loeber (40)
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RICKERT'S HIATUS IRRATIONALIS

An Epistemological Approach to Empirical Reality

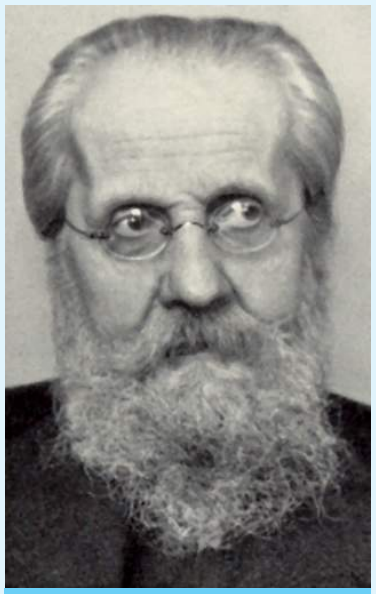
SAM KENT

HOW DOES ONE MAKE SENSE OF THE *HIATUS IRRATIONALIS*, THE GAP BETWEEN NATURE'S INHERENT IRRATIONALITY AND RATIONAL HUMAN CONCEPT-FORMATION? THIS ARTICLE EXAMINES EPISTEMOLOGICAL SOLUTIONS THAT ATTEMPT TO RESOLVE THIS LOGICAL RIDDLE. THE FAILURES OF PLATONIC CONCEPTUAL REALISM AND THE EPISTEMOLOGICAL REALISM OF THE EMPIRICAL PSYCHOLOGISTS ARE ANALYZED BEFORE THE WORK OF NEO-KANTIAN PHILOSOPHER HEINRICH RICKERT IS APPROACHED. RICKERT'S THESIS THAT EMPIRICAL REALITY IS A *HETEROGENEOUS CONTINUUM* AND HIS RESULTING EPISTEMOLOGY OF THE NATURAL AND HISTORICAL SCIENCES ARE EVALUATED TO SHOW BOTH THE EXTENT AND THE LIMIT OF HIS WORK.

Heinrich Rickert, a prominent Neo-Kantian thinker, wrote fiercely against the popular rise of German Positivism. His significant contributions to this discussion have been largely overlooked in contemporary circles. Indeed, only two of his books have been translated into English, and a mere handful of secondary sources exist on the subject, yet Rickert's philosophic discourse remains utterly relevant to this day. His work eventually led him to the elusive puzzle of empirical reality: most concisely, how does one scientifically approach the inherent irrationality, or the *hiatus irrationalis*, of reality? This article will examine formal solutions to this logical riddle. To preface the discussion, Rickert's conception of empirical reality and the necessity of methodology will be considered. Then the formal failures of Platonic conceptual realism and the epistemological realism of the Empirical Psychologists will be analyzed before examining the methodologies of the Natural Science and Historical Science as argued by Rickert. It should be noted that this article is not interested in Rickert's ontological development of Nature and Culture, but rather the epistemological implications of his works. Undeniably, this is a difficult distinction to make since his work emphasizes both formal and material principles of classification. Yet, by limiting the field of examination, an in-depth comparative review of methodologies becomes possible.

Rickert's central thesis is that empirical reality is a heterogeneous continuum.[1] Reality here is conceived as a phenomenological entity that is "first and foremost the experienced reality of everyday life."[2] This is to say that there is an intuitive apprehension of the perceived, which is reality. There are three critical aspects that must be understood to appreciate Rickert's definition: reality's heterogeneity, continuity, and irrationality. Reality is composed of a spatio-temporal uniqueness that is non-repeatable, creating a qualitative individuality that is encompassed in the theorem of the heterogeneity of everything real. This individuality is not restricted by any temporal or spatial limits; it is endless, *unendlich*, and without limits, *unübersehbar*.[3] This extensive complexity complicates cognition, as foundational limits are lacking. Additionally, reality is defined by an intensive complexity of its immeasurable manifold; that is, there exists a qualitative infinity that lacks a criterion to determine the most fundamental element.[4] As Rickert relates, "even the 'smallest' part contains more than any mortal man has the power to describe."[5] This presents another cognitive difficulty, as human faculty proves insufficient to comprehend the complexities of any examined unit.

Furthermore, there is a second characteristic to consider: empirical reality is a "continuum of gradual transitions."[6] This stands in tension with its heterogeneous characteristic, as qualitative individuality seemingly excludes a universal continuity. The continuity is an acknowledgement that reality is a flux, that "nature makes no leaps."[7] This is encompassed in Rickert's theorem of the continuity of everything real.



HEINRICH RICKERT, A PROMINENT NEO-KANTIAN

Finally, reality is irrational. This is a function of the intuitive unity of the heterogeneous continuum—the combination of reality's first two characteristics. Its "continuous differentiation" is implicitly understood as being "irreducible to concepts," since the heterogeneous individuality and the general continuity appear to mutually refute each other.[8] As such, a *hiatus irrationalis* arises between concept and reality. This cognitive dissonance between concept and reality requires methodology to be approached.

Rickert believes that the riddle of reality can only be analyzed epistemologically or formally, not ontologically or substantively. An ontological approach where "there is nothing that could be exempted as a matter of principle from an investigation" permits only one valid empirical

science, "since there is only one empirical reality."[9] This fails to account for the unified dual characteristics of reality—heterogeneity and continuity—which refute conceptualization. Without conceptualization, there is no orientation of the self in the complexity of reality.[10] It should be noted that according to Rickert's lexicon,

> methodology should not be understood in its contemporary sense, as an ensemble of research techniques, but rather as a theory of the concepts essential to the constitution of these sciences.[11]

The task of methodology is to make an explicit formal criterion necessary for meaningful conceptual abstractions.

"Without conceptualization, there is no orientation of the self in the complexity of reality."

The formal construct allows for a "principle of selection" to distill the essential from the unessential, which cannot be otherwise intuitively grasped, in order to provide *a priori* judgments about delimiting subject-matter.[12] Doing so produces a coherent unity that facilitates agent orientation in the otherwise irrational reality.

Platonic conceptual realism is the first methodological attempt to resolve the riddle of reality. This approach incorrectly assumes concepts or Ideas as exclusively essential, necessarily negating the other aspect of the *hiatus irrationalis*—reality—as unessential. In a rejection of the phenomenological world of senses, particularities, which would be associated with the heterogeneity of reality for Rickert, are seen as mere "representations or copies of the generic, archetypal Ideas."[13] This effectively provides an objective foundation for natural sciences in a transcendent universal realm.[14] Yet, there are three logical problems. First, in avoiding the *hiatus irrationalis* by neglecting reality, conceptual realism loses relevance to empirical experience. Second, by reorienting epistemology towards conceptual realism, another formal problem arises in that the transcendental and its relation to the copy or the particular cannot be directly established.[15] Third, assuming conceptual realism as a premise leads to an antinomy: cognition as a particular is a passive copy; yet, it is a *sine qua non* that cognition is an active agent that "reconstructs the data of immediate experience by means of concepts" since "this is the only activity directly accessible to us that could possibly bring into being the desiderated copy of transcendental reality."[16] These considerations indicate that conceptual realism is not a viable epistemological foundation for a scientific approach to empirical reality.

The epistemological realism of the Empirical Psychologists assumes a monistic methodology that ultimately proves unfit to process the heterogeneous continuum. At its foundation is the copy of reality thesis, which assumes the entirety of the empirical reality as essential and attempts to duplicate it. While conceptual realism rejects reality in favor of concept, epistemological realism forces concepts to replicate reality. This appears to effectively dissolve the tension of the *hiatus irrationalis* as well as to accept both reality's heterogeneity and continuity. Yet, it is the "wrong idea that the task of knowledge is to provide a complete reproduction of empirical reality."[17] There are two reasons why epistemology should not be founded on the copy of reality thesis. First, assuming all of reality as essential proves methodologically unachievable. *Abbildlogik*, or the logic of reproduction, proves ungrounded because "our mind is far too limited to encompass, store up and grasp the intensive and extensive complexity of the heterogeneous continuum in its totality."[18] Indeed, reality's inexhaustibility *vis-à-vis* the human finite faculty causes the very need for mental orientation that is provided through the sciences. Second, its concept-formation logic of duplication leads to a *reductio ad absurdum*. As Rickert notes, "a mirror would 'cognize' best, and a model colored with perfect fidelity would come closest to the 'truth,' at least with regard to the visible aspect of things." According to this line of thought, a conceptual duplication is worthless for two reasons: (a) a conceptual copy of reality is redundant as the original is phenomenologically available; and (b) the intrinsic irrationality is reproduced when empirical reality is duplicated, thus requiring an-

IMMANUEL KANT, ONE OF THE GREAT THINKERS IN WORLD HISTORY

other methodology to comprehend the reproduced copy. As a result, "where epistemology is dominated by the copy theory of knowledge or the ideal of pure description, the only consequence must be absolute skepticism," as cognition is left disoriented.[20] In short, this epistemological foundation fails to properly interpret empirical reality. It appears that formal considerations dismiss the utility of epistemological realism.

Rickert saw great epistemological potential in the question of reality. Intriguingly, he assumed the *hiatus irrationalis* as a premise rather than an obstacle, as was normally the case. Following in the tradition of Windelband's nomothetic-idiographic categorization, Rickert proposed his own formal division according to the logic of generalization and individualization.[21] This allowed for the two characteristics of empirical reality—heterogeneity and continuity—to be dealt with separately, thus avoiding the *hiatus irrationalis* without having to resolve it.[22] Irrationality and infinite complexity only become rationally accessible after empirical reality has been conceptually distorted.[23] The distortion, as specified by Rickert, requires transforming "the heterogeneous continuum in everything real into a homogeneous continuum or into a heterogeneous discretum."[24] The methods of Natural Science examine the homogeneous continuum, while those of the Historical Sciences are concerned with the heterogeneous discretum. While they are in praxis related in an intermediate field, these two compatible methodologies are still formally independent.

It was Immanuel Kant who first proposed the stipulated field of the Natural Sciences according to his formal criterion: reality "as far as it is determined according to universal laws."[25] Doing so provided an objective epistemology to ground the Natural Sciences that avoided the formal contradictions of epistemological realism. However, it also required limiting the field of study from examining the entirety of empirical reality to its general continuity. Rickert applied this logic of generalizing in order to formally structure his methodology of the Natural Sciences, which is reflected in its organization, concept-formation, criteria of validity, and principle of selection.

The methodology of the Natural Sciences organizes its subject-matter according to general classes, or genera, which subsume particular physical or psychic phenomena, or specimens, according to "unconditionally general propositions," or laws.[26] These conceptual laws are governed by the logic of generalizing, which holds what is generally representative as true. To reiterate, law's validity corresponds to the degree of spatiotemporal generalization.[27] This is "not because they reproduce reality as it actually exists but because they represent what holds validly for reality."[28] The formal structure is realized in concept-forming practices in the Natural Sciences. Comparative and isolative abstractions examine a plurality or singularity of cases, respectively, in order to make general statements about members of the relevant class. These statements hold equally valid to all in the class, whether the specific cases are observed or not.[29] In doing so, it sacrifices the direct intuitive immediacy of the perceptual concreteness of reality (*die Anschaulichkeit der Wirklichkeit*).[30] That necessarily distorts reality by transforming the heterogeneity of reality into an artificial homogeneity in order to properly

interpret the continuity of reality. This is done according to the *a priori* selection principle of generalizing laws that determine essentiality for the Natural Sciences. In short, the essence of the Natural Sciences is the general; all particularity is disregarded. While effectively neglecting the extensive and intensive infinity of the manifold, the "individuality of the concrete" is lost and all spatiotemporal uniqueness is eliminated.[32]

Here, the methodological limits of the Natural Sciences become apparent. As Rickert argues,

> [the formal] limits of natural scientific concept formation, and which the natural sciences can never surmount, is nothing but unique empirical realty itself…in its concrete actuality and individuality.[33]

Indeed, by disregarding the empirical perception, individual description is eliminated. Still, the mathematical foundation of the Natural Sciences does make a claim of particularity with its quantitative individuality. However, this individuality proves to be a mere ideal extension that fails to reproduce the quantitative richness of empirical reality.[34] This raises concerns about the representational validity of general constructs if quantitative individuality fails to appropriately represent the particularity of reality. The problem can be identified in the founding logic: it is formally argued that validity has an inverse relationship with proximity to reality. This construct falls apart at the extreme. According to this logic, the purely abstract universal quantitative realm holds absolutely valid despite having no reference to the real. Here, the logic falls apart in a manner similar to conceptual realism. Thus, the formal structure fails to limit the division between concept and reality, effectively exacerbating the *hiatus irrationalis*. Despite this logical weakness, the methodology of the Natural Science still proves to be an effective tool for representing and interpreting the continuity of reality.

The Historical Sciences provide the second methodology that completes Rickert's epistemological approach to the *hiatus irrationalis*. Revealingly, Rickert dedicated a disproportionate amount of time to discussing the methodology of the Historical Science. He viewed it as the innovation in his philosophic discourse. Distinct from the Natural Sciences, the Historical Sciences methodology transforms the heterogeneous continuum into a determinable realm of discrete objects according to the formal logic of what Anton Zijderveld calls "radical individualization."[35] This distortion of empirical reality provides a criterion of what is scientifically interesting by assuming the "spatiotemporally unique and non-repeatable qualities that differentiate [an object] from every other real entity" as essential. Yet, as Rickert clarifies, these sciences "must abandon the domain of sense perception" similar to the Natural Sciences. However, he continues, they "still remain dependent on the unique and individual process of the event itself."[36] This has the advantage of addressing the infinite complexity of reality at the expense of the continuity of reality.[37] A logical concern arises at this point: what provides the *a priori* principle of selection that determines essentiality in this methodology?

Historical concepts are abstracted from the content of knowledge as essential. Yet, the Historical Sciences do not "reproduce the concrete perceptual quality of reality," but require a positive selection judgment about essentiality according to relevance to values.[38] This complicates the formal structure of historical concept-formation. Essentiality becomes dependent on the historic ordering principle of values derived from Rickert's ontology of culture. Here we encounter our limit: Rickert's material categorization is beyond the scope of this article. It is sufficient to state that objective cultural valuations account for the Historical Sciences' principle of selection. The apparent weakness of creating an ontological-dependent epistemology raises other formal concerns of this methodology.

Rickert himself realizes several potential logical weaknesses in his arguments. First, the necessary "reduction of perceptual reality" in historical concept formation appears to violate qualitative individuality.[39] If this is the case, the Historical Sciences provide a mere descriptive analysis. Rickert responds to this charge by insisting, "the immediacy of reality is necessarily destroyed, but the consideration does not alter the legitimacy of this point of departure for a logical investigation."[40] Unfortunately, this yields to another problem that Rickert also noted: the conceptual individual-

ity seems as unreal as the scientific generality.[41] Indeed, concepts and the language cannot grasp the discrete since they aim at the common or general. Thus, instead of relying on empirical intuition, imagination must intuitively recreate the particularity.[42] This appears to be a weak foundation on which to ground an epistemology. While avoiding a commentary on his ontological thesis on culture, it is sufficient to say that there is a logical concern about making formal methodology dependent on the subject matter being examined. Rickert claims that the copy of reality thesis fails by making methodology a function of material differences yet falls into the same trap. By making the formal structure of the Historical Sciences a function of value judgments determined by the objects being studied, rather than determining which objects to study, epistemology becomes irrelevant.

In conclusion, epistemological approaches to empirical reality have been reviewed. First, Rickert's riddle of reality was explained by examining the *hiatus irrationalis* of the heterogeneous continuum. Next, the necessity of a methodology was discussed. Finally, these formal approaches were analyzed. By negating all particularity, Platonic conceptual realism was found to be irrelevant, formally constraining due to the indeterminable transcendental, and simply fallacious in its antinomy *vis-à-vis* cognition. Epistemological realism similarly failed to provide an objective epistemological ground for scientific endeavor, as its methodology proved unachievable and logically contradictory. Rickert's two methodological approaches fared better. The Natural Sciences, organized according to the logic of generalizing, provided a robust framework for the sciences that is formally limited by its quantitative foundation. On the other hand, the Historical Sciences, governed by the formal principle of individualizing, appeared to provide an effective foundation for the sciences. Still, both were found wanting in the end. Rickert's discussion about the *hiatus irrationalis* of empirical reality continues to have profound epistemological implications for the sciences today. As the modern sciences continue to encounter new and unforeseen obstacles in its pursuit to understand nature and culture, Rickert's work seems to deserve a second chance.

ENDNOTES

1. Rickert, Heinrich, Science and History: a Critique of Positivist Epistemology, (Princeton: Van Nostrand, 1962), 34.
2. Zijderveld, Anton, Rickert's Relevance: The Ontological Nature and Epistemological Function of Values. L(Boston: Brill, 2006), 229.
3. Oakes, Guy, Weber and Rickert: Concept Formation in the Cultural Sciences, (Cambridge: MIT Press, 1988), 52.
4. Oakes, Guy, Weber and Rickert: Concept Formation in the Cultural Sciences, (Cambridge: MIT Press, 1988), 54.
5. Rickert, Science and History, 32.
6. Rickert, Science and History., 33.
7. Ibid.
8. Rickert, Science and History, 34; Koslowski, Peter, Methodology of the Social Sciences, Ethics, and Economics in the Newer Historical Schools: From Max Weber and Rickert to Sombart and Rothacker, (New York: Spinger, 1997), 67.
9. Rickert, Science and History, 13.
10. See Rickert, Science and History, 42 for more about the orienting role of methodology
11. Koslowski, Methodology of the Social Sciences, 61.
12. Rickert, Science and History, 37.
13. Rickert Science and History, 31.
14. Rickert, Heinrich, The Limits of Concept Formation in Natural Science: A logical Introduction to the Historical Sciences, (Cambridge: Cambridge University Press, 1986), 44.
15. Rickert, Science and History, 31
16. Ibid.
17. Rickert, The Limits of Concept Formation in Natural Science, 42.
18. Zijderveld, Rickert's Relevance, 237.
19. Rickert, Science and History, 31-32.
20. Rickert, Science and History, 34.
21. Zijderveld,, Rickert's Relevance, 246.
22. Rickert, Science and History, 44.
23. Note that "concepts are forms which mold the matter of reality, putting it into a rational order which is not representation or reproduction of this overwhelmingly complex and always changing realty but, on the contrary, a conscious distortion of it." Zijderveld, Rickert's Relevance, 229-230.
24. Rickert, Science and History, 34.
25. Rickert, Science and History, 5.
26. Rickert, Science and History, 40, 43; For more about the the nomological regularity of the concept of a scientific law see Oakes, Weber and Rickert, 62.
27. As Rickert clarifies, "the validity of concepts in natural sciences depends on the extent to which they abstract from reality." Rickert, Science and History, 72.
28. Rickert, The Limits of Concept Formation in Natural Science, 44.
29. See Rickert, Science and History, 43.
30. Oakes, Weber and Rickert, 68; Rickert, Science and History, 41.
31. See Oakes, Weber and Rickert, 64.
32. Rickert, The Limits of Concept Formation in Natural Science, 45; Rickert, Science and History, 41.
33. Rickert, The Limits of Concept Formation in Natural Science,

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34. Rickert, Science and History, 35.
35. Zijderveld,, Rickert's Relevance, 256; Rickert, Science and History, 34.
36. Rickert, The Limits of Concept Formation in Natural Science, 52-53.
37. Oakes, Weber and Rickert , 65; ; Rickert, Science and History, 35; Rickert warns that "Such an analysis can never comprehend the complete intensive manifold of its perceptual material." Rickert, The Limits of Concept Formation in Natural Science, 50-52.
38. Koslowski, Methodology of the Social Sciences, 67.
39. Rickert, The Limits of Concept Formation in Natural Science, 79.
40. Rickert, The Limits of Concept Formation in Natural Science, 53.
41. Rickert, The Limits of Concept Formation in Natral Science, 52.
42. Rickert, Science and History, 73.

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JESUITS AND SORCERY

The Social Evolution of the Society of Jesus in New France

ANTHONY ULIANO

IN THE EARLY SEVENTEENTH CENTURY, THE JESUITS INFILTRATED NATIVE AMERICAN SOCIETY, IN WHAT IS NOW THE NORTHEASTERN UNITED STATES AND PRESENT DAY CANADA, AND TOOK HOLD OF THE SOCIAL POSITION FORMERLY OCCUPIED BY THE SHAMANS, OR SORCERERS. IN DOING SO, THE SOCIETY OF JESUS TOOK AN IMPORTANT STEP IN CONVERTING THE INDIGENOUS PEOPLES OF NEW FRANCE TO CATHOLICISM. THIS ARTICLE ANALYZES THE PRACTICES USED BY THE SHAMANS AND JESUITS IN DEFENDING THEIR RESPECTIVE RELIGIONS, AS WELL AS THE TACTICS EMPLOYED BY THE JESUITS TO ACHIEVE THE AFOREMENTIONED COUP, AND THE NATIVE PEOPLES' RESPONSE. UTILIZING JESUIT PAUL LE JEUNE'S ACCOUNT OF HIS OWN INTERACTIONS WITH NATIVE POPULATIONS, THIS ARTICLE DELVES INTO THE QUESTION OF HOW THE JESUITS CONVERTED THE NATIVE AMERICANS OF NEW FRANCE TO CATHOLICISM, AND EXPLORES THEIR NEED TO ESTABLISH SUPERIORITY IN A POLITICAL AND RELIGIOUS SETTING.

PAUL LE JEUNE THE SUPERIOR OF THE JESUITS IN QUEBEC FROM 1632-1639

In the seventeenth century, the Jesuits, a religious order founded in 1534 by Ignatius of Loyola, ventured to New France to convert the indigenous population to Catholicism. In the process of doing so, however, the Jesuits had to overcome a major obstacle: the native religion. The embodiment of this religion, the shamans, or native sorcerers, posed a major threat to the Jesuits' attempts at conversion. The priest-like shamans were involved in every facet of native life, conducting healing, religious, and spiritual rituals. Additionally, the shamans also treated illnesses, predicted and allegedly controlled the weather, and were capable of causing or curing diseases. This article will discuss how the Jesuits infiltrated native society and took hold of the social position formerly occupied by the shamans and indicate why this was such an important step in converting the indigenous peoples of New France to Catholicism. This article analyzes the practices and tactics of the shamans and the Jesuits in defending each one's respective religion. The article also analyze some of the tactics employed by the Jesuits to achieve the "coup," with a focus on the Jesuit Paul Le Jeune, their effectiveness, the responses of the shamans and natives, how the natives responded, how the Jesuits viewed the shamans, and how the shamans viewed the Jesuits.

The sources also show specific instances of rivalry between Jesuits and shamans, again with an emphasis on Le Jeune, who will serve as the case study.[1] These specific examples elucidate how the Jesuits viewed the shamans and vice versa by offering some of the native voices in the account. These instances demonstrate the methods used by the Jesuits to combat specific techniques employed by the shamans to hinder the Jesuits.

Le Jeune was the superior of the Jesuits in Quebec from 1632-1639. He garnered great respect from his fellow Jesuits throughout his lifetime because of this esteemed position, among other qualities.[2] Le Jeune is a valuable example because of the length of time he spent with the natives, specifically the Montagnais, and the concerted efforts he made to understand their culture and religion in an attempt to convert them. Le Jeune reveals many of the inner workings of the Montagnais and illustrates how their way of life compared to Le Jeune's and the Jesuits.

The religion of the natives had great influence on the way they conducted their daily lives. Supplanting an entire way of life of a population is not an easy task. The shamans especially benefited from this way of life due to their status in society as priests with personal powers. Thus, the shamans became the targets of the Jesuits. The Jesuits took a three-pronged offensive to uprooting the shamans.[3] The first attack was the undermining of the whole fabric of native belief that supported the shamans' influence. The Jesuits then challenged the shamans' authority by attacking or disproving many of their practices. Finally, they sought to persuade the entire community that the Jesuits' own religion was more efficacious than the shamans' "jugglery," and that they could replace them with little effort.[4]

In the fall of 1633, Paul Le Jeune was wintering with a group of Montagnais and their chief Mestigoit. The party included a shaman and the shaman's brother. In his account of this winter, Le Jeune gives an example of a Jesuit attack on shamanistic practices. Le Jeune's aim in accom-

panying the hunting party was to improve his knowledge of the natives' customs while simultaneously encouraging them to abandon their superstitions and to embrace Christianity.[5]

In one tale, the tribe's shaman performed a ritual that involved the spirits of light or air, which allegedly granted the juggler the ability to see the future. Le Jeune wrote, "certain jugglers, who know better than the others how to impose upon and amuse these people" were the ones who performed these rituals among the Montagnais.[6] This writing serves as evidence that Le Jeune disapproved of the ritual and the jugglers performing it. The claim that jugglers perform this ritual to "amuse" others reflects Le Jeune's feelings about the ritual. Le Jeune goes on to give his observation of the ritual:

> He shook the tent at first without violence; then becoming animated little by little, he commenced to whistle, in a hollow tone, and as if it came from afar...disguising his voice so that it seemed to me I heard those puppets which showmen exhibit in France.[7]

Again, Le Jeune condemns the sorcerer's practices by comparing the sounds to "puppets" in France. Le Jeune implies that the ritual is a hoax when he uses the term "animated" to describe the sorcerer's voice. He also claims that the sorcerer disguised his voice, implying that the sorcerer was inside the tent making noises, and rejecting the possibility that spirits are inside the tent with him. Le Jeune continues to describe the event in detail:

> At first, as I have said, he shook this edifice gently; but, as he continued to become more animated, he fell into so violent an ecstasy, that I thought he would break everything to pieces, shaking his house with so much force and violence, that I was astonished at a man having so much strength; for, after he had once begun to shake it, he did not stop until the consultation was over, which lasted about three hours.[8]

Le Jeune's vocabulary and tone indicates a negative opinion of the ritual, while the term "animated" reflects the idea that the shaman is acting in this ritual. Also, Le Jeune calls the natives who believe that there are actually spirits in the tent "barbarians" as opposed to "savages."[9] Although these terms have similar connotations, nowhere else in this passage does Le Jeune address the natives as barbarians.

In describing his reaction to the entire event, Le Jeune reveals many of his views of the natives and sorcerer. Le Jeune describes his reaction to the event:

> Sometimes I begged them to have pity on this poor juggler, who was killing himself in this tent; at other times I told them they should cry louder, for the genii had gone to sleep.[10]

Le Jeune is filled with a mix of emotions here. He feels pity for the juggler, but at other times feels superior to him. In either case, he is implying that the ritual is false and that he is better than the shaman. This is supported by Le Jeune's writings when he claims "I could have said as much myself, for one needed not to be a prophet or a sorcerer to guess that, inasmuch as the poor creature was already struck with death."[11]

This is in response to the genii's alleged consultation with the shaman in regards to the status of the shaman's wife's health. This passage depicts Le Jeune clearly undermining the rituals of the native shamans. An example of this undermining by Le Jeune comes when he calls "these genii" the "juggler who counterfeited them."[12] This unraveling of the fabric of native belief is the first of Axtell's aforementioned three-pronged attack by the Jesuits on the shamans.

Le Jeune continues to contest the sorcerer who performed the ritual and resolves to find out more about the genii. After the ritual, Le Jeune explains that the sorcerer knew that Le Jeune was trying to expose him and that he "disapproved of his nonsense" and thus, "did not wish to explain anything to me, so that I was compelled to make use of my wits." Le Jeune writes that he

> Allowed a few weeks to pass; then, springing this subject upon him, I spoke as if I admired his doctrine, saying to him that it was wrong to refuse me, since to all the

> questions which he asked me in regard to our belief, I answered him frankly and without showing any reluctance.

The sorcerer, in light of this, reveals to Le Jeune the "fable" of the genii.[13]

Le Jeune's tactics for trying to supplant the shaman, as well as the shaman's view of Le Jeune, are evident in this interaction. When Le Jeune becomes aware that the shaman knows he is trying to disprove his ritual, he proceeds to underhandedly flatter the shaman so as to bring his guard down before asking him about the ritual again. This deceit is illustrated in Le Jeune's writings after he allows a few weeks to pass before speaking to the sorcerer "as if I admired his doctrine."[14] Le Jeune attempts to flatter the sorcerer here by pretending to respect the sorcerer's ritual, justifying the sorcerer's divulgence of his ritual by telling him that it was the right thing to do (to reciprocate knowledge).[15] These tactics helped Le Jeune gain knowledge of the beliefs of the natives, which ultimately helped to prove said beliefs as mere superstitions.

Greer appears to have been right when he claimed that Le Jeune impressed the Montagnais with his odd beliefs.[16] For example, Le Jeune confronted the "Manitou" or the devil, an action considered outlandish by the native people. Le Jeune recounts:

> During the night, a woman who had gone out, returned, terribly frightened, crying out that she had heard the Manitou, or devil. At once all the camp was in a state of alarm, and every one, filled with fear, maintained a profound silence.[17]

Le Jeune then writes that he

> Began to laugh, and rising to my feet, went out of the cabin; and to reassure them I called, in their language, the Manitou, crying in a loud voice that I was not afraid, and that he would not dare come where I was. Then, having made a few turns in our Island, I reentered, and said to them, "Do not fear, the devil will not harm you as long as I am with you, for he fears those who believe in God; if you will believe in God, the devil will flee from you."[18]

"By impressing the natives with his beliefs, Le Jeune gained recognition throughout the tribe."

This was due to the fact that Le Jeune confronted the Manitou, which the natives feared, and came out unscathed. He impressed the natives with his audacity and bravery in the face of what the natives perceived as imminent danger. In standing up to the Manitou, Le Jeune garnered the natives' respect and took one step closer to conversion of the natives. When Le Jeune's host returns, he tells Le Jeune that he "learned the story" and asks, "if he really had no fear of the Manitou." He then thanks Le Jeune for "giving courage to his people."[19] The fact that his host learned the story implies that the natives were talking about Le Jeune's courageous actions.

By impressing the natives with his beliefs, Le Jeune gained recognition throughout the tribe, and according to James Axtell, this was important for the Jesuits usurping the shamans. Axtell says that novelty was a powerful tool in "cutting the links of habit that bound the Indian people to their ungodly past" in that it "drew a crowd and got the priests a hearing for their strange ideas."[20] This was half the battle for the conversion of the natives and the supplanting of the shamans in that it led to the next step, which according to Axtell was the "self-righteous audacity" of the Jesuits. This audacity, "helped the natives to question the legitimacy of their current views and possibly accept the new religion provided by the Jesuits."[21]

Another example of the Jesuits' audacity is found in *The Jesuit Relations* when Le Jeune recounts a 1637 dispute between the sorcerer Pigarouich and himself in New France. In this account, Makeabichtichiou, the leader of the tribe,

claims that he will adopt the customs and beliefs of the Jesuits, so Pigarouich finds it appropriate to confront Le Jeune. Le Jeune writes that the sorcerer was "jealous, as the other so-called captain was" and threatened by Le Jeune because Le Jeune had established himself in the tribe as an important figure.[22] Both Le Jeune and Pigarouich began vying for the trust and approval of the tribe leader, Makeabichtichiou. Although the leader at this time in native society was usually not an absolute authority, he was almost always listened to and revered by the people. According to Axtell, Le Jeune baited the shaman by ridiculing his practices and accusing him of arguing in "horse-and-mule" fashion.[23]

Le Jeune recounts the sorcerer's response to his words in front of the tribe. In Le Jeune's account, Pigarouich states:

> There are five things that I will not give up—the love for women, the belief in our dreams, the eat-all feasts, the desire to kill the Hiroquois [sic], the belief in sorcerers, and making feasts.[24]

The Montagnais believed in feasts, dreams, warfare, and polygamy while, in accordance with Catholicism, the Jesuits believe in peace, abstinence, and monogamy. This is important because the Jesuits' goal of conversion relied firmly upon the natives' acceptance of their doctrines, which, if the natives were to accept, would result in the rejection of the sorcerers' beliefs. When they realized that they might lose their high status in society, the sorcerers decided to fight back in an attempt to hold the indigenous population's support.

Le Jeune then confronted the sorcerer and tries to show him the error of his ways. Le Jeune saaid "you will see every day that they cannot cure any sickness with their drums and other nonsense, if you have any sense you will give up all that."[25] Le Jeune called the practices of the shaman nonsense and refuted their abilities to heal. In retaliation, Pigarouich bet Le Jeune that his tent would shake violently through his ability to conjure the demons, which produce light.[26] Le Jeune willingly accepted the wager and recounted that at the time when the bet is to take place, the sorcerer had gone to hunt rabbits:

> His people said among themselves that he was afraid, that he had no courage; some of them were astonished, and wondered at our belief; others said the French were greater sorcerers than they were.[27]

When Pigarouich fled the wager, the seed was planted in the minds of the natives that perhaps their religion was flawed and they should convert.

Le Jeune's tone may be construed as one of arrogance, given the situation and his willingness to claim that some of the natives now believed that the French were greater sorcerers than they were. In analyzing Le Jeune's tone, one must question the validity of this account. Did Le Jeune exaggerate or even fabricate this story in order to cast himself in a better light? This is a question which must be considered given the likelihood that Le Jeune knew his accounts would be published or even circulated to a large audience of people. He wanted the Jesuits' missions in New France to seem successful, and desired to be worthy of consideration, as there may have been some beneficiaries who would pull funds from the Jesuit missions traveling to the New World if the attempt to convert the natives was failing.

One of the Jesuit's greatest weapons in combating the shamans was their knowledge of technology. Axtell states that

> Perhaps the most persuasive [tactic] was their demonstration of technological skills, which included not only knowledge of contemporary Western science and geography, but an impressive range of spiritual techniques for manipulating nature.[28]

This tactic was in fact extremely persuasive and effective in convincing the natives that the Jesuits were more powerful than the shamans because the Jesuits were well educated and thus knew many scientific truths that the shamans did not. An example of this is Le Jeune's impressing of the natives with the use of magnetism. Axstates that

> The Jesuits' technological expertise confirmed their reputation as men possessed of extraordinary men to be

> revered and feared at the same time, as the shamans once were.[29]

The Jesuits made continual use of their extensive knowledge of technology in attempting to disprove and discredit the shamans. Axtell continues to reiterate the fact that the Jesuits "sought to confirm their reputation as powerful medicine men at every opportunity" and that "the simplest French artifacts made disproportionately large impressions on native audiences."[30] Le Jeune manipulated his knowledge of science and technology to his benefit in *The Jesuit Relations* immediately after Pigarouich returned to the village after hunting rabbits. Le Jeune recounts that:

> I took a sheet of article, and made them hold it by the four corners; then, having placed upon it some needles, I slowly passed my hand over it, holding between my fingers a little lodestone. The needles, attracted by this stone, went and came, advanced and retreated, according to the movement of my hand. They were astonished at seeing these needles run and turn about, without any one touching them. Seeing their amazement, I told the sorcerer that he should do the same; he answered by staring at me, without saying a word. I explained to them that this was a natural phenomenon, that I did not avail myself of the devil, in order to do it, and that it was a wicked thing to use his help; that in France they put Sorcerers and Magicians to death, when they could be discovered; that the evil spirit never did any one any good; that in the beginning he tried to cover up his malice, but in the end he deceived those who had recourse to him.[31]

Le Jeune's account indicates that the natives were astonished at his manipulation of the needles. This astonishment was due mainly to the ignorance of the natives, but Le Jeune used their ignorance to his advantage. This interaction put Le Jeune firmly ahead of Pigarouich in the race to acquire elevated status in native society and to occupy the position formerly held by Pigarouich.

The manner in which Le Jeune gained said elevated position should be evaluated. It seems that Le Jeune and the Jesuits held out from telling the truth to the natives for the sake of the greater good. Axtell accordingly says, "in the opinion of the missionaries, all these things served to gain the natives' affection,"[32] which according to Le Jeune, served to "render them more docile when we introduce the mysteries of our faith; for the belief they have in our intelligence and capacity causes them to accept without reply what we say to them."[33]

The Jesuits further used technology to their advantage by establishing "superior intelligence" over the natives. By establishing this superiority, the Jesuits hoped the natives would simply adhere to their views based on the fact that the Jesuits were smarter than the savages. It is important to question why Le Jeune would advocate pulling the wool over the natives' eyes rather than enlightening them in all facets of Catholic life—including and especially technology. Also, we must question whether the natives really felt affection towards the Jesuits and their superior technologies or whether they merely feared or coveted them. If the latter was the case, then many natives, upon learning the secrets of the technology, would undoubtedly have questioned the Jesuits' integrity and the basis of their beliefs. However, the superior and unfamiliar technologies the Jesuits owned reinforced the native view that the Jesuits could do as much harm as good. This is similar to how the shamans were viewed at the time. Thus, the Jesuits cleverly employed this tactic and it had a profound impact on their position in relation to their shaman counterparts.

"The needles, attracted by this stone, went and came, advanced and retreated, according to the movement of my hand. They were astonished at seeing these needles run and turn about, without any one touching them."

SAINT JEAN DE BREBEUF SPEAKING TO THE LEADERS OF A TRIBE IN NEW FRANCE

With the shamans unable to explain or produce the technology that the Jesuits could, the latter established superiority over the former in the eyes of the indigenous population.

According to Axtell, "one of the Jesuits' greatest allies in the effort to establish superiority over the shamans were the lethal diseases they inadvertently brought over from Europe."[34] In 1637, Le Jeune recounted to his superior how the sorcerer Tonneraouanont "did not succeed in his cures anymore than in his prophecies" and how "therefore, he lost a great deal of his credit, and his whole practice was reduced to a single cabin, in which he himself was sick."[35] The loss of the sorcerer's credit was based on the Jesuit's ability to triumph over the diseases that were evident in this time. When the sorcerer himself became sick, the other natives inferred that the Jesuits were more powerful than he. This is merely one example of how the shamans were helpless in the face of the diseases brought over by the Jesuits. It was in this helplessness that the Jesuits once again established superiority over the jugglers. Axtell notes that "the shamans' traditional songs, dances, incantations, and gyrations were totally impotent" and "not only could the native physicians not cure their tribesmen, but they often fell victim to the new diseases themselves."[36] The incapacitation and ineffectiveness of the shamans in curing and fighting the ailments brought by the French were a major loss in the battle for superiority amongst the natives. The Jesuits, with their immunities, proceeded to nurse and comfort the ailing natives, which also worked in their favor. Whenever they could heal someone or alleviate suffering, they would attribute it to God's grace as opposed to their medicinal knowledge.

The Jesuit Jacques Bigot recounts how during the Abnaquis mission in 1683, the natives were sick because, "I told them that God, like a good father was chastising them with that disease in order to have them atone for their sins."[37] Essentially, Bigot tried to convince the sick natives that their ailments were being caused by their sins. Their conversion and acceptance of Catholicism would help them to get better. This manipulation of current events aided the Jesuits in their struggle to supplant the shamans in that the natives, looking at their ailing brethren (including the shamans), justifiably started to believe that accepting Catholicism would heal them. Since the Jesuits were mostly healthy, it made sense for the natives to believe that they, too, would be granted health in exchange for the acceptance of Catholicism. With the shamans ailing just as badly as the other natives, the Jesuits took a seemingly dominant position in native society that formerly belonged to the sorcerers.

The shamans, however, did not concede defeat easily. Their last push consisted of blaming the Jesuits for the diseases that blighted the villages. In Jerome Lallemant's relation while at the mission of Tadoussac in 1647, there was a magician who attempted to push away the Jesuits by saying that the cause of the sickness was the Jesuits. The magician reasons:

> We are all becoming sick, since we have given up our former customs. The prayers that we offer serve only to make us die; the more we believe, the more we fail in hunting, and the more we are attacked by famine. Give up those rosaries and the other marks of a Christian which these black robes have given you; cast everything into the fire, if you would escape death.[38]

In the same relation on the same mission, another sorcerer claims that he consulted the Manitou:

> The Manitou declared that the Faith and prayer brought death to most of those who embraced it; that the Fathers who preached to the Savages were deceived, and that one must not be astonished if they deceived those who listened to them...that it was not the God of the believers who governed the Earth, especially their countries,—that it was he who ruled the Savages; and that they would die much oftener than usual, because they had left him.[39]

Although the Jesuits unknowingly brought disease to native society, they made profound efforts to heal the sick. The shamans were correct when they said that the black robes brought the disease. This was not caused by baptism, however, and surely not by the native's infidelity towards the Manitou, or Demon. Rather, these last two instances appear to be desperate attempts by some of the sorcerers to retain power and create scapegoats of the Jesuits. The shamans attributed the disease-ridden population to the departure from the customs which brought the shamans previous power and wealth. Clearly, this was a desperate attempt by the shamans, who had endured the battle against the Jesuits for almost twenty years, to regain their power and followers.

The Jesuits and shamans were political rivals during this time period. The subversion of the established Native American way of life was needed in order for the Jesuits to convert the indigenous persons to Catholicism. Naturally, the sorcerers who were already in power sought to retain the status quo of native society. The Jesuits launched an offensive against the shamans that ranged from initial infiltration and subtle undermining to outright and audacious challenges of native practices. The Jesuits used their superior education and knowledge of the world along with the occasional manipulation of certain truths in order to disprove the sorcerer's beliefs. Without the sustained attack on the shamans, the Jesuits would have struggled even more to convert the natives. The shamans represented everything that needed to be overcome in order for the tribes to become Catholic. The shamans operated in nearly every facet of native life and dictated many of the standard norms. Rather than eradicate the position of the shamans, however, the Jesuits sought to supplant them and retain a similar position in society. This is due to the fact that the position in the social hierarchy of native life dictated the beliefs of the natives. If the Jesuits were able to occupy these positions, then they could in turn dictate the standards of the Native Americans and would be able to con-

vert more natives than they would have been able to otherwise.

FOOTNOTES

1. Thwaites (6:163)
2. English
3. Greer (21)
4. Axtell (93)
5. Greer (21)
6. Thwaites (6:163)
7. Thwaites (6:165)
8. Thwaites (6:167)
9. Ibid.
10. Ibid.
11. Ibid.
12. Thwaites (6:171)
13. Ibid.
14. Ibid.
15. Thwaites (6:173)
16. Greer (21)
17. Thwaites (7:87)
18. Thwaites (7:88)
19. Ibid.
20. Axtell (94)
21. Ibid.
22. Thwaites (11:251)
23. Axtell (98)
24. Thwaites (11:251)
25. Thwaites (11:253)
26. Thwaites (11:255)
27. Thwaites (11:257)
28. Axtell (100)
29. Ibid.
30. Axtell (101)
31. Thwaites (11:262)
32. Ibid.
33. Thwaites (8:113)
34. Axtell (96)
35. Thwaites (13:213-215)
36. Axtell (97)
37. Thwaites (63:89)
38. Thwaites (31:245)
39. Thwaites (31:243)

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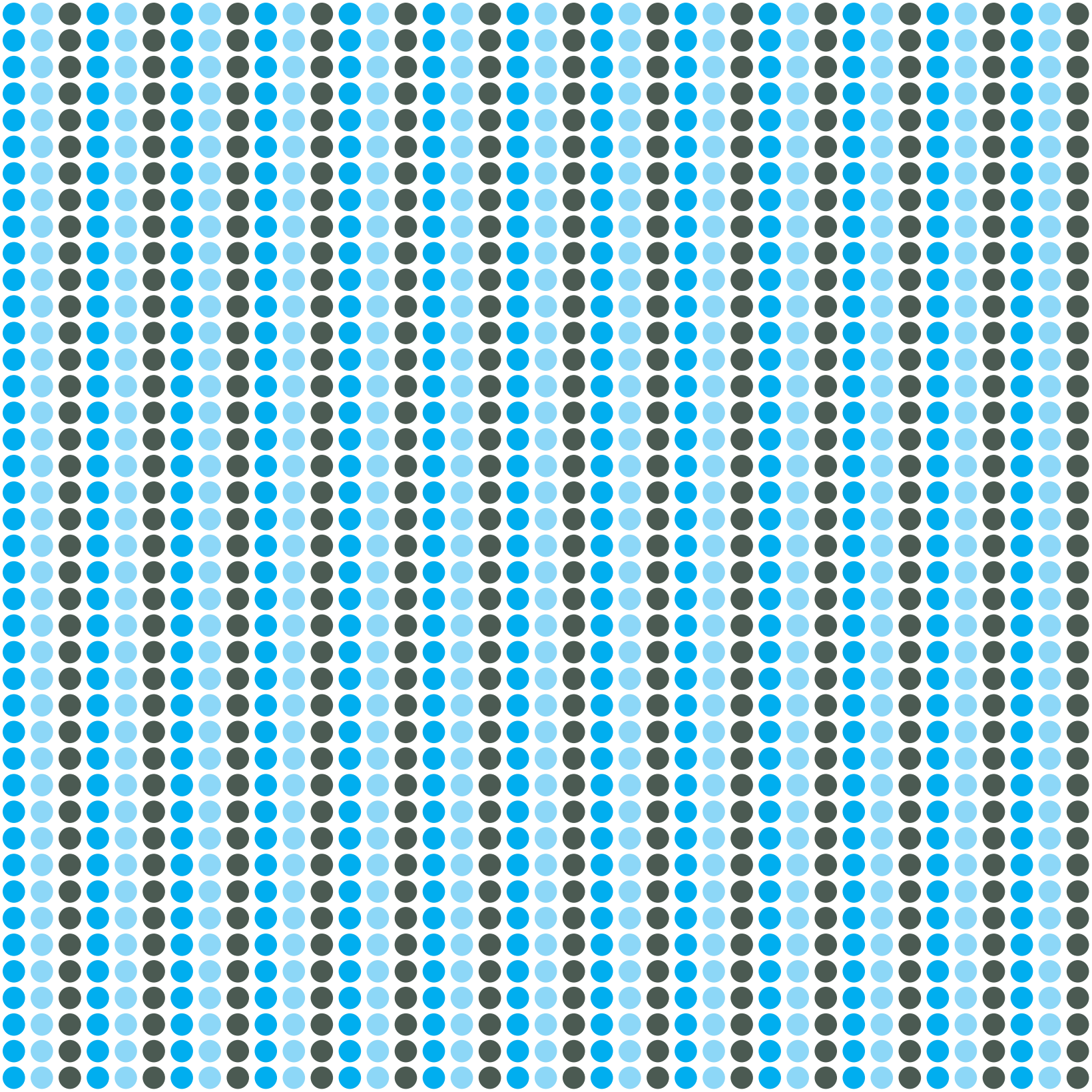

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The Author declined to provide a photo.

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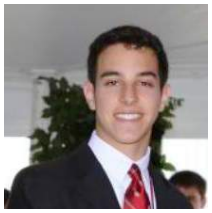

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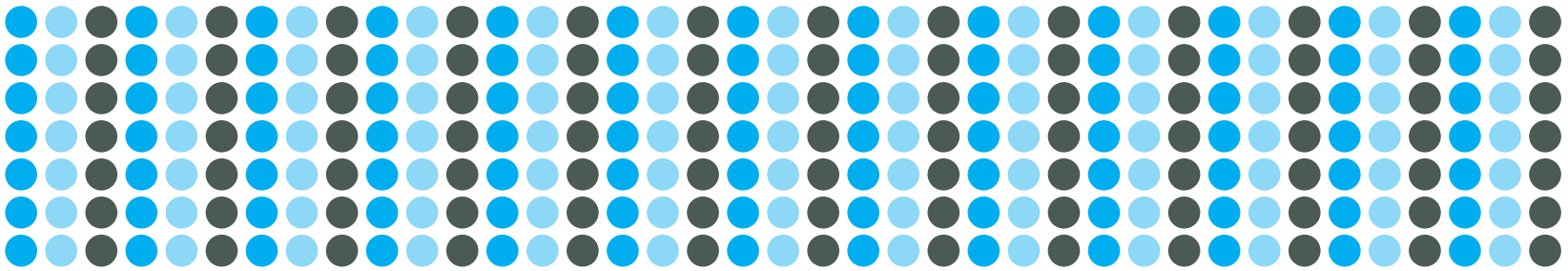

LIST OF ARTWORK

88 ILLUSTRATION OF SAINT JEAN DE BREBEUF SPEAKING TO INDIAN COUNCIL