Dear Reader,

It is with great pride that we, the editors, present to you the 1999-2000 *Gold Star Journal*. No matter how trying or agitating the process seemed at times, the difficult road taken to produce this final work was well worth all of the effort. We had a unique pleasure in sampling some of the best academic work being done on this campus by our students, and we felt privileged by this opportunity.

What excited us so much was not collecting, choosing, or editing papers. As any person who has ever been a student knows, editing a paper does not enliven the soul with great energy or fire. In fact, it is just plain boring at times. The part of the process that made our work so interesting was discovering the people behind these papers. All of these scholars are individually well known in their respective academic departments as devoted and passionate students.

So, when you read these works, please do not consider them as simply necessary work undertaken for the sole purpose of "getting a grade." Instead, judge these as works of genuine service to their academic communities. By writing and submitting these papers, each of these students adds another line in the infinite dialogue of knowledge.

Finally, and most importantly, the editors thank not only the writers, but the faculty and staff that made this year's journal a reality. Dr. Susan Mabrouk, the faculty advisor and founder of the journal, helped us stay focused throughout the process and added her insight from past experiences with this publication. Also, we extend a very special thank you to the Writing Center staff and, in particular, Barbara Anderson, Daphne Thompson, and Angela Williams for their time and expertise. Finally, we would like to thank Russell Pace for the cover photograph and Cadet Giorgi for procuring it.

Without further verbiage from us, we present to you our humble offering -- the 1999-2000 *Gold Star Journal*.

The Editors
Lee Miller, Harry Tashjian, and Courtney Walsh

Dear Reader,

It is with great pride that we, the editors, present to you the 1999-2000 *Cold Nose Journal*. No matter how taxing or agonizing the process seemed at times, the difficult road taken to produce this final work was well worth all of the efforts. We had a unique pleasure in sampling some of the best academic work being done on this campus by our students, and we feel privileged by this opportunity.

What excited us so much was not [illegible], choosing, or editing papers. [illegible] In fact, it is not all fun sorting of papers. The part of the process that made our work so interesting was discovering the people behind these papers. All of these people are individually well known to their respective academic departments as devoted and promising students.

So when you read these works, please do not consider them as simply necessary work undertaken for the sole purpose of "getting a grade." Instead, judge these as works of genuine service to their academic communities. By writing and submitting these papers, each of these students adds another link in the infinite dialogue of knowledge.

Finally, and most importantly, the editors thank not only the writers, but the faculty and staff that made this year's journal a reality. Dr. Susan Hilligoss, the faculty advisor and founder of the journal, helped us step forward throughout the process and added her insight from past experiences with this publication. Also, we extend a very special thank you to the Writing Center staff and, in particular, [illegible] Thompson, and Angela Williams for their time and expertise. Finally, we would like to thank [illegible] for the cover photograph and [illegible] for presenting it.

Without further verbiage from us, we present to you our humble offering — the 1999-2000 *Cold Nose Journal*.

The Editors
Lee Miller, [illegible], and Courtney Walsh

Table of Contents:

Biological Terrorism: America's Achilles Heel

Ian Scott Purdue

Ian Scott Purdue, from Dallas, Texas, is a member of the Class of 2001 and is majoring in political science with a focus in law and legal studies. Upon graduation this year, he will work with the police department in the city of Carrollton, Texas. The following paper was written for Dr. Gardel Feurtado's Special Topics in Domestic Terrorism class and brings to light the threat of modern bioterrorism, which is possibly the greatest threat to national security and the American public.

Not since the Cuban Missile Crisis and the threat of nuclear attack have the national security and well-being of the United States been endangered to the degree that they are now. The new threat is that posed by biological terrorism in the twenty-first century. Is the United States of America prepared for the threat of this frightening kind of terrorism? The past twenty years have seen a dramatic increase in biological terrorism within our borders, ranging from idle threats to successful attacks.

Proliferation of technology has greatly simplified the production of biological weapons. The increase in technology, the availability of weapons grade agents, and the rise of foreign and domestic terrorist activity within the United States have greatly increased the threat of biological terrorism. In 1982, an act of biological terrorism sent seven hundred and fifty people to the hospital in the city of The Dalles, Oregon (Purver 21). In 1997, the Federal Bureau of Investigation (FBI) opened seventy-four cases to investigate threats or attempted procurement of biological or chemical weapons, of which twenty-two dealt with biological threats. Of the one hundred and eighty-one Weapons of Mass Destruction (WMD) threat cases that were opened in 1998, one hundred and twelve were of biological terrorism. That is more than a five hundred percent increase in the number of biological threats in just one year (Burnham 1).

A broad range of viruses, bacteria, and toxins are the preferred weapons available to today's enterprising terrorists. The acquisition of a biological agent is simple, although choosing and developing the proper dispersion method and system is more difficult. The use of biological weapons dates back to the Middle Ages, when warring factions would catapult plague infested bodies into besieged castles in attempt to destroy the fortress from within. While many nations possess biological weapons, few have ever employed these weapons on the battlefield. Biological weapons are often difficult to control after release and are non-discriminating, attacking both friend and foe, thus making them a part of the Law of Unintended Consequences. The FBI, Central Intelligence Agency (CIA), and the State Department monitor terrorist groups, both at home and abroad, who have the potential to use these weapons of mass destruction. These agencies are also charged with developing and implementing appropriate countermeasures.

A number of possible agents can be transformed into biological weapons, and among the most likely are anthrax, botulinal toxin, ricin, cholera, smallpox, and influenza. *A biological agent need not be deadly to be effective.* The mass flood of casualties would quickly overwhelm the medical system and available medical supplies, making even minor cases possibly fatal, as with this year's flu epidemic which has overwhelmed local resources. Fear and panic caused by a biological attack may, by itself, be enough to further the terrorists' goal. Experts believe three agents are the most likely candidates for use in biological weapons: ricin, botulinal toxin, and anthrax (Purver 9). These agents were chosen by using six factors: "toxicity; ease of manufacture or other acquisition, cultivation and dissemination; hardiness; immunity to detection and/or countermeasures; rapidity of effect (this may be desirable in some instances and not in others)" (Purver 7).

Ricin, which can be easily extracted from a castor bean with minimal biological knowledge and skills, has been used in a number of assassinations. Botulinal toxin can be extracted from botulin bacteria, which can be cultured easily and safely in a home laboratory. Anthrax is by far the most powerful and deadly biological agent. "[I]f its spores were distributed appropriately, a single gram would be sufficient to kill more than one-third of the population of the US" (Purver 1). The anthrax spore is inhaled into the respiratory system and lungs, causing pulmonary anthrax, a respiratory disease that is fatal in a large portion of cases. The accidental explosion of an anthrax biological weapon, containing less than one gram of anthrax spores, in 1979, in Sverdlovsk, USSR, killed at least 68 people (McGovern 13).

A number of methods may be employed to acquire biological agents, including mail order, natural sources, theft, and through sympathetic governments. Viruses and bacteria can be bought through mail order companies that supply cultures to medical and collegiate research facilities. Often the only security measure in place is that the order must be written on the institution's letterhead. "Marijuana is more closely regulated in the United States than access to and distribution of most deadly biological cultures" (Purver 12). Many agents can be obtained from nature, by isolating the cultures from natural sources: ricin from castor beans, anthrax from cattle, and tricothecene mycotoxins from corn (Purver 10). Obtaining these cultures naturally requires expertise but provides an added level of security because it is nearly impossible to discover the act. Most college biology departments have deadly biological cultures on hand with minimal, if any, security. Often small amounts of cultures can be stolen without the knowledge of the department. The fourth source is friendly governments. It is known that Iraq, Iran, and North Korea all have biological weapons programs and have a history of supporting terrorist groups. While these countries are possible sources for cultures and expertise, they are unlikely source as most governments fear the swift and vengeful retaliation that would follow identification of the sponsor of such an attack (Purver 12). The fear that the terrorist group might turn on its master and use the weapon against the sponsor is also real.

The two most likely ways of contracting a disease or illness are through inhalation and oral consumption, which narrows the possible dispersion methods available to bio-terrorists. They can use an airborne agent or they can contaminate food and water supplies. The most popular method of airborne dispersion is called aerosolization.

In this method, the agent is mixed into a liquid solution and sprayed into the air using a ultra fine mister. This method can be employed on a large scale using aircraft to spray cities much like crop dusters spraying fields or on a smaller scale using an air brush to introduce the agent into a ventilation system of a building or domed sports arena. The shortcoming of the aerosol method is that it requires an extremely hardy agent be used because of the stresses caused by the aerosolization. It is also a challenge to ensure that the mist is fine enough to be inhaled into the respiratory system and take effect. On the other hand anthrax is a perfect agent, due to its nearly indestructible spore state which is unaffected by the elements of nature (Inglesby 5).

In the 1950's, the United States government experimented with aerosolization techniques, conducting mock biological attacks in major cities from New York City to Washington, D.C. to San Francisco. The government conducted these mock attacks using Bacillus globigii and Serratia marcescens as the biological agents and then tracked the dispersion and infection rates (Purver 17). These tests resulted in at least one death through complications associated with infection. They also gave our government a good understanding of the dispersion, effects, and limitations associated with aerosolization.

A second method for airborne dispersion produces an agent in a fine dust or powder, then dumping it strategically in a subway or train station. Each time a train passes through, the dust is aerosolized into the air and inhaled by those in the station or subway. The ideal agent would be one that is contagious and has a two to three day incubation period. Persons inhaling the agent would then become carriers of the disease and then bring it back to their cities and spread it there. By the time the authorities were able to understand what had happened, the disease could have spread halfway across the country.

Poisoning food and water supplies is another method of attack. The water supplies of the US are insecure, permitting a terrorist to easily dump a biological agent into a city's water supply. The purification process is complex enough to kill most of the bacteria and viruses introduced into the system, unless the agent is introduced after the process when the water supply is most vulnerable. However, it is difficult to achieve even dispersion of the agent in the water, and often the agent will settle to the bottom of the tank. It may still provide as a good terror attack whether successful on a biological basis or not, if the intended goal is population fear and loss of perceived security, attacking the society from within.

Food supplies can also be attacked. Grain fields or storage units can be sprayed with funguses or restaurants can be poisoned. In 1982, a number of restaurant salad bars in the city of The Dalles, Oregon were laced with Salmonella typhi (typhoid). Over 750 people became ill in a small homegrown attack intended to influence local elections (Purver 21). Bacteria, viruses, funguses and insects can attack food supplies. In 1989, a group called the "Breeders" claimed responsibility for the Mediterranean fruit fly infestation of Southern California's fruit industry (Purver, 22).

Biological weapons have certain limitations. A basic understanding of microbiology is needed, but a third year biology major has enough knowledge and experience to splice DNA genes and to culture biological agents. It is this knowledge that is needed to make and create biological agents. Many of the agents are sensitive to sunlight and temperature changes. Another problem is creating a dispersion method that would allow the agent to be suspended in the air for the longest period of time possible, maximizing the ability to be inhaled by the target population.

Biological weapons are not new inventions. The first recorded use of biological weapons in the United States was in the mid-1800's when the US cavalry issued smallpox infested blankets to the Native Americans, killing scores. In 1915, a German American physician, with the assistance of the German Imperial Government, killed over 3,000 horses and mules destined for the Eastern Front by inoculating them with Anthrax (Purver 23). Members of the right wing group, Order of the Rising Sun, were arrested for possessing 30-40 kilograms of typhoid bacteria (Purver 21). These incidents, along with the Medfly infestation by the Breeders and Rajneesh cult's typhoid attack in The Dalles, show the practicality of the concept.

Year	Number of WMD Cases Opened	Number of Biological threat Cases Opened
1996	37	Unknown
1997	74	22
1998	181	112
Jan-May 18 1999	123	100

(Burnham 1)

A number of reasons exist for refraining from the deployment of biological weapons including infection danger in the production processes and lack of control after deployment. The horror of the act threatens imminent retaliation from the victimized country and alienation from the rest of the world. The production of biological weapons can be a dangerous process. If the terrorists fail to take the necessary precautions, they could infect themselves. Most biological agents have vaccines available, so that the terrorists can immunize themselves against the agent. A secondary consideration is that most nationalist and ethnic type terrorists have safe houses in supportive communities. "The Irish Republican Army has safe houses in predominately Irish communities and the PLO in Palestinian communities" (Purver 25). If the weapon were to prematurely initiate or an accident were to occur during the creation process, there would be a great threat to the local community and thus their local base of support, a highly undesirable outcome.

After a biological weapon is deployed, there is no way for the terrorists to control it. If the winds change direction, it could infect the wrong target population. Some biological agents are self-reliant, meaning they are able to reproduce after infection and be spread. One person infects two or more individuals, who in turn each infect more, much like a nuclear reaction. This can be desirable in some instances and very undesirable in others. Biological weapons are indiscriminant killers; they do not distinguish between race, ethnic group or national alliance.

Which terrorist groups are most likely to employ biological weapons? In order to effectively evaluate this question one must first categorize the different terrorist groups. The first separation is international terrorist groups versus domestic terrorist groups. The past forty years have seen an increase in international terrorists targeting the United States, at first abroad and more recently at home. The three main categories of international terrorists are liberation movements, world revolutionaries, and anti-United States/Western society. Liberation movements, such as the Irish Republican Army, (IRA) are the least likely of the three categories to use biological weapons, primarily due to the fact that liberation movements must gain the support of the people to be successful, and a biological attack is so heinous of a crime that it would prove counter-effective (Purver 29). World Revolution groups like the Japanese Red Army (JRA), the Red Army Faction (RAF), and the Red Brigade could consider the application of biological terrorism to further their goals of world chaos and revolution, thus reverting back to a state of anarchy. The Anti-American Muslim fundamentalist groups such as Hizbollah, Hamas, and Abu Nidal's organization have all previously committed large scale attacks and would be likely to use biological weapons against the United States in an attempt to bring about the destruction of the "Great Satan", the US (Purver 29).

Domestically, the three categories of terrorist groups likely to investigate the use of biological weapons and possibly attempt to deploy them are Neo-Nazis, environmental terrorists, and some apocalyptic cults. While most *doom's day* and apocalyptic cults are reactive groups, some of these groups preach the commission of ultra-violent acts to help usher in the coming apocalypse. The FBI has been keeping a close watch on these proactive groups, because of the added emphasis many place on the new Millennium (Megiddo,1).

Neo-Nazis, the Aryan Nation, and violent white supremacist groups like Der Bruder Schweigen Strike Force II have the potential to use biological weapons to further their goal of a white America. Many Neo-Nazi groups have expressed interest in obtaining biological weapons. In 1995, the FBI arrested Larry Wayne Harris, a microbiologist, for fraud related to the obtaining of bubonic plague cultures. He claimed to be writing a biological weapons training manual for the Aryan Nation (Burnham 2).

The third threat group is the environmental terrorists. Some of these groups believe that the world is over-populated and poisoning the earth with toxins. Some of the more radical splinter groups might consider using biological weapons on a very broad scale in an attempt to reduce the earth's population, looking back to the bubonic plague that killed at least one third of the world's population in the fourteenth century, "*Mother Nature's own solution to over-population*" (Chemical 4).

Although the government feared that the coming of the new Millennium would trigger actions by apocalyptic, neo-nazi, and militia groups, no immediate terrorist events took place. Apocalyptic groups see the new Millennium as the date of the coming apocalypse (Megiddo 26). The FBI's Megiddo report was considered by some to be overly alarmist. However, the proof of the premise does not require that a terrorist action take place on any precise date. The fact that the new Millennium marks the start of an indefinite "end-time" for apocalyptic groups suggests alertness is still required. Additionally, some Neo-Nazi groups see the new Millennium as the beginning of the coming race war (Megiddo 19).

The three categories of biological terrorism targets are humans, livestock, and agriculture. A biological attack on humans may be on large or small target populations. Terrorists can use a vehicular or airplane mounted aerosolization machine to attack a city on a large scale, affecting hundreds of thousands of people, or they could use something as simple as an airbrush, commonly used for painting model airplanes, to introduce a selected biological agent into the ventilation system of a large building or arena. The latter method allows for a more controlled use, on a specific target population. Large sporting events, such as the Super Bowl, World Series, Stanley Cup, or the Olympics, are possible terrorist targets. Terrorists want publicity, the more the better. It allows for their cause or plight to be heard around the world over the news and CNN. What better place than an event that already has millions of people watching?

Livestock is another possible target, either attacking animals in the pastures or at meat packing plants. This can be accomplished using an aerosol method or through the poisoning feed or water supplies. While not necessarily affecting humans directly, this technique would spoil large amounts of meat, raising the prices of meat because of the diminished available supply. This effect was be seen in Great Britain and Europe, as they were plagued with Mad Cow disease. This epidemic was accompanied by a fear factor, because no one knew what meat they could trust, thus devastating British cattle and meat markets. It would only take a few attacks on livestock in different parts of the country to generate this fear. There is little protection or surveillance of livestock, making them easy targets.

Agriculture is the third possible target group. Food stocks such as wheat and other grains are susceptible to bacterial and fungal attacks. The United States exports a large portion of the world's wheat and grain supplies. An attack on the breadbasket of America would thus be an assault on the world as well as the United States' economy. This would likely be the target of Eco-terrorists who believe the world is over-populated and is killing Mother Nature. A large scale attack on wheat and grain supplies using crop duster like deployment of a biological agent could destroy many thousands of acres of wheat and grain, easily bringing famine and death to countries reliant on US wheat and grain, such as Russia and the Koreas.

With the threat of biological terrorism growing every day, steps must be taken to defend against this "poor man's atomic bomb." Proactive and reactive are the two forms of counter-measures, and both are extremely important. Proactive defenses include gathering intelligence, researching early warning systems, and vaccines. Reactive defense is a quick-strike capability; the ability to respond quickly and take appropriate measures and counter-measures to provide for the safety of the community. President Clinton recently signed a bill allocating ten billion dollars to defend against WMD terrorism within the US. Forty three million will be used for research and development against biological weapons (Keeping 1).

A proactive defense is the most effective form of defense. The best defense against biological terrorism is stopping an attack before it is carried out. If this is successful, it minimizes the need for reactive defense. Intelligence is a crucial part of the proactive defense. The FBI, CIA, and the State Department must keep close watch on terrorist groups that have the disposition or means to use biological weapons. There have been no major biological attacks in the United States, but there have been a large number of arrests of terrorist cells having biological agents in their possession with the intent to use them as weapons of mass destruction. Also part of a proactive response is the proliferation of biological research. A number of fields are being researched, including epidemiology and the categorization of natural outbreaks, vaccine inquiry, early detection systems, and counter-measures to biological attacks.

Epidemiology is an important medical field in dealing with biological terrorism. Webster defines epidemiology as, "the branch of medicine dealing with the incidence and prevalence of disease in large populations and with detection of source and cause of epidemics" (Webster 449). Epidemiologists catalog different naturally occurring viral and bacterial outbreaks to be cross-referenced with possible biological attacks. Many viruses are in a state of constant mutation, so it is important to continually update disease portfolios in order to develop vaccines and antidotes. A few antibiotics and medicines can be used to combat a variety of possible biological agents; streptomycim, gentamicin, and chemoprophylaxis agents should all be stockpiled in large quantities for rapid deployment to the scene of a biological attack (Bioterrorism, 70)(Drugs, 15).

There is currently no feasible early detection/warning system available to detect a biological attack. As of now, a biological attack may not be detected until casualties begin coming into hospitals, one or two at a time in the beginning and then by the hundreds and thousands, quickly overwhelming even the largest medical communities. The "just in time" inventory ordering systems currently utilized, save inventory, but can be easily depleted by large demands. Most agents used in biological weapons can be effectively dealt with using antibiotics, but it is crucial that they be administered within two days of the attack. By the time symptoms become apparent, 3-7 days later, the agent has spread throughout the host, infecting critical organs. At this point it is often too late to cure. Anthrax, for example, has an incubation period of 3-15 days, "the interval between onset of symptoms and death averaged three days" (Inglesby 7). It is the speed at which these agents act that necessitate the development of an early warning system.

Counter-measures against biological attacks, both proactive and reactive, must also be researched and developed. For example, ventilation systems are perfect delivery vehicles for biological agents. The introduction of high-efficiency, particle-absorbing (HEPA) filters would prevent the distribution of the agent through the ventilation systems (Purver 33). Reactive countermeasures currently being researched include disinfectants and high power ultraviolet lasers to neutralize biological agents (Purver 34).

The lack of United States' laws prohibiting the possession of class three pathogens, weapons grade agents complicates law enforcement's efforts to fight biological terrorism. Under federal law it is only illegal to possess class three pathogens if one has the intent to use them as a weapon (Burnham 1). Recent legislation is attempting to address some of these issues by limiting the availability and possession of weapons grade biological agents to those with legitimate purposes and adequate safety requirements.

At the present time reactive defense measures constitute the United States best counter to minimizing the effectiveness of the biological agent and the number of casualties. These include the stockpiling of vaccines and antidotes for biological agents. A large scale attack on a city could produce millions of casualties, quickly depleting local supplies. Quick response and reaction teams must be developed, effectively trained and properly equipped. These teams include fire, HAZMAT, police, medical, state and federal emergency management groups (Bioterrorism 70). It is their job to arrive on the scene rapidly and begin to handle the situation in a manner to minimize casualties. Cities must prepare a plan for dealing with a biological attack. What steps to take, the chain of command, priority of response and allocation of resources must all be discussed, rehearsed, and decided on before an attack takes place, in order to mount an effective response (Purver 34).

The history of biological warfare and terrorism is hundreds of years old, but it was not until recently with the proliferation of technology that the threat of biological terrorism against the United States became a national defense focus. A biological

terrorist attack against a major city has the potential to kill hundreds of thousands and the United States now sees the necessity of taking action to defend against such an attack. Many experts in the field of counter terrorism and intelligence feel that the threat of an act of biological terrorism is no longer a matter of if, but, instead; when, where, and how devastating?

Is Undesirable Speech Protected? Ideological Rhetoric, the Free Speech Clause, and Supreme Court Case Law

Derek D. McLeod

Derek D. McLeod, from Traverse City, Michigan, is a member of the Class of 2000 majoring in political science with a focus in law and legal studies. Upon graduation this year, he plans to attend law school. The following paper examines the definition of freedom of speech in terms of its intended use by our forebears and details different cases that question the limit of freedom of speech in how it is used by society today.

Introduction

The Free Speech Clause of the First Amendment to the U.S. Constitution has served as an important forum for the airing of grievances and political and social dissent throughout the nation's colorful history. It has also, however, been a vehicle for hate speech against racial and ethnic groups and government. The language of the amendment is clear: "Congress shall make no law ... abridging the freedom of speech" (Cox 1998, 124). Within this unmistakably clear wording, the courts can and have made exceptions allowing Congress and the state legislatures to make laws restricting certain kinds of speech. Americans have "engage[d] in often heated discussions concerning the guaranteed right of citizens to freedom of expression and when, if ever, freedom of expression should be limited, regulated, or even prohibited" throughout the history of the republic (Schultz 1999, 41 Ariz. L. Rev. 573+). Nonetheless, defining what speech should be *free* and what speech should *not* be has always been and will continue to be an issue the American people and the courts debate.

The Supreme Court of the United States has taken up the issue of hate speech and anti-government rhetoric in several cases this century. Subsequent decisions from these cases have determined what speech is and is not protected. The Court's findings have made distinctions regarding the foregoing: "the First Amendment's admonition to make no law abridging the freedom of speech has been interpreted to mean Congress [and the respective states through the Fourteenth Amendment are] to make no law abridging the freedom of certain kinds of speech" (Schultz 1999, 41 Ariz. L. Rev. 573+).

The Free Speech clause thus allows many diverging opinions to be uttered. Susan Tolchin (1999, 98) observed that "Americans [generally] reserve a high tolerance for language, however odious, knowing that fringe elements can function freely in a democracy without tearing apart the fabric of society." Therefore, this inquiry shall trace how the Court's decisions both protect *and* limit hate speech and the advocacy of violence towards specific groups and government in general.

Free Speech Justifications and the Defining of Doctrine, Tests, and Terms
Four Scholarly Justifications for Free Speech and Expression

The Court's adjudication of the First Amendment fundamentally states that no limitations may be placed on one's right to speak his/her mind, no matter how politically or racially detestable or motivated the speech. The right serves a social function if hate speech propagators are constitutionally permitted to articulate offensive speech. There is a benefit to society to allow for the advocating of subversive governmental overthrow. The following are four justifications for free speech and expression to better comprehend these presumptions.

Professor Calvin Massey (1992, 40 UCLA L. Rev. 103+) notes that "free expression is indispensable for the promotion of the free flow of ideas that is necessary for a democratic polity to govern itself." Massey reiterates the Madisonian Dilemma (the majority's legitimate right to rule and the minority's right to retain certain liberties): "if majorities can censor the vernacular of public discourse, from the perspective of silenced individuals the process by which the majority rules" (Massey 1992, 40 UCLA L. Rev. 103+). In this qualification of free speech, the "underlying assumption is that the established society is free, and that any improvement … would come about in the normal course of events, prepared, defined, and tested in free and equal discussion" (Marcuse 1999, 267). Free speech, therefore, permits the airing of alternative viewpoints.

A second justification for free speech comes from John Milton's *Areopagitica:* "Let [Truth] and Falsehood grapple; who ever knew Truth put to the wors[e], in a free and open encounter. Her confuting is the best and surest suppressing" (Massey 1992, 40 UCLA L. Rev.103+). British philosopher John Stuart Mill echoed Milton's call for a 'search for truth' when he wrote:

> [That] the peculiar evil of silencing the expression of an opinion is, that it is robbing the human race; posterity as well as the existing generation; those who dissent from the opinion, still more than those who hold it. If the opinion is right, they are deprived of the opportunity of exchanging error for truth: if wrong, they lose, what is almost as great a benefit, the clearer perception and livlier impression of truth, produced by its collision with error" (Mill 1991, 655).

Justice Oliver Wendell Holmes declared that free speech is "more likely to discover truth and eliminate error, to produce good rather than bad policies, if … discussion is to be free and uninhibited" (Dworkin 1996, 200). Holmes even went so far as to proclaim that "'[i]f there is any principle of the Constitution that more imperatively calls for attachment than any other it is the principle of free thought" and free speech (Schwartz 1993, 221). Thus, in a free exchange of ideas and thoughts, when it relates to the government and governmental policy, Americans are more likely to find the political truth through a free and open discussion of ideas.

A third free speech justification comes from Professor Massey. He explains that free speech and expression imply a "process of moral deliberation involv[ing] an expression of views or thoughts, and subsequent reconsideration upon realization of the expressed sentiments upon others" (1992, 40 UCLA L. Rev. 103+). Thus, the banning of "racist speech" is "counterproductive" in the long-term in that "it enables the dominant society to tell itself (smugly and falsely) that, collectively, *it* has no problem; the problem lies wholly within those nasty racists who we have righteously muzzled;" however, "[t]he dangerous dog of racism is still a biter when muzzled" (Massey 1992, 40 UCLA L. Rev. 103+). Justice Holmes noted that the First Amendment must protect "even the speech we loathe" (Dworkin 1996, 205). The support of racist speech will not quell hostilities that would otherwise be aired. With free speech, *all* members of society can feel as though they have a right to voice an opinion, no matter how much intense displeasure it brings.

Professor Thomas Emerson additionally notes (Ducat 1996, 912): "Freedom of expression is essential to provide for participation in decision making by all members of society." Such free expression and speech serve to allow all members of society greater participation in social and political dialogue, be they racists or candidates for political office. Former D.C. Circuit Court Judge Robert H. Bork maintains that the third free speech justification does not relate to the "gratification of the individual, at least not directly, but to the welfare of society" (1990, 216).

A fourth justification of free speech and expression serves as "a method of achieving a more adaptable and hence more stable community, of maintaining the precarious balance between healthy cleavage and necessary consensus" (Ducat 1996, 913). Free speech, therefore, promotes a vigorous public discourse of problematic issues instead of dissolving society because opposing viewpoints cannot be aired. Richard Delgado and David Yun contend that "the [American Civil Liberties Union] ACLU and those who take a relatively purist position with respect to the First Amendment, [hold] that hate speech ... and ... [other] forms of expression ought to be protected precisely because they are unpopular" (1995, 27 Ariz. St. L.J. 1281+).

Therefore the examination of the Free Speech Clause begins with the understanding that free speech and expression are indeed desirable in American democracy. Second, James Madison argued that "free speech is necessary if the people are to be in charge of their own government," and this reasoning "explains why government must not be allowed to practice ... censorship" (Dworkin 1996, 203). Thus, the Framers believed that free speech was an important enough right to be included in the Bill of Rights when they penned the First Amendment. Third, the Supreme Court, in *Wooley* v. *Maynard*, 430 U.S. 705, 97 S.Ct. 1428, 1977 U.S. LEXIS 75 (1977), held that speech need not be oral. Thus, unspoken expressions are constitutionally protected speech (e.g., nonverbal gestures). Fourth, "[i]n practice" speech may be constitutionally suppressed when it "creates a likelihood of substantial harm to the" 'autonomy of consciousness' (Reed 1997, 35 Am. Bus. L.J. 1+).

The "Fighting" Words Doctrine

An unanimous Court upheld the conviction of a Jehovah's Witness "who called a police officer 'a God damned racketeer' and 'a damned fascist'" (Ducat 1996, 916). Therefore, in *Chaplinsky* v. *New Hampshire*, 315 U.S. 568, 571-572, 62 S.Ct. 766, 769, 1942 U.S. LEXIS 851 (1942), the Court decided that "[t]here are certain well-defined and narrowly limited classes of speech, the prevention and punishment of which has never been thought to raise any Constitutional problem" (*Chaplinsky, supra*).

With this decision, the Court set forth the so-called "fighting" words doctrine. "Fighting" words are "those [words] which by their very utterance inflict injury or tend to incite an immediate breach of the peace" (Ducat 1996, 916). Furthermore, the Court claimed "that such utterances are no essential part of any exposition of ideas, and are of such slight social value as a step to truth that any benefit that may be derived from them is clearly outweighed by the social interest in order and morality" (1942 U.S. LEXIS 851+).

According to Michael J. Mannheimer, the "development of the fighting words doctrine has made the standard for the constitutional protection of insulting language coextensive with the clear and present danger test" (1993, 93 Colum. L. Rev. 1527+). The "clear and present danger test" was a necessary extended version of the "fighting" words test because "the rationale [for the "clear and present danger" test] was so brief and received so little elaboration, it was difficult to predict what the reach of *Chaplinsky* would be" (Goldberger 1991, 56 Brooklyn L. Rev. 1165+). The test was then furthered in *Schneck* with the advent of the "clear and present danger" test.

The "Clear and Present Danger" Test

The "clear and present danger" test was first established in *Schneck* v. *United States*, 249 U.S. 47, 39 S.Ct. 247, 1919 U.S. LEXIS 2223, 63 L.Ed. 470 (1919). Craig R. Ducat reconstructed the "clear and present danger" test from the several "clear and present danger" opinions. The test consists of the following three parts (1996, 919): (1) whether … [D]efendant intended the achievement of particular criminal consequences (known in criminal law as 'specific intent'); (2) whether [the criminal] actions presented a 'clear and present danger' that the criminal target objective would be reached; and (3) whether the criminal objective amounted to a grave evil." In order for the government to sustain a conviction on these grounds, all three parts of the test must be achieved.

The Brandenburg Test

The Brandenburg test (See *Brandenburg* v. *Ohio* – Appendix D) is essential to understanding how the Supreme Court has interpreted grave and/or substantive evils against the State. The Court, in *Brandenburg*, stated that advocacy (to be later defined) is "protected speech … 'except where such advocacy (1) … [is] directed to inciting or producing imminent lawless action and (2) [is] likely to incite or produce such action'" (Crump 1994, 29 Ga. L. Rev. 1+). *Brandenberg* has become "the modern test for protection of speech with a 'tendency to lead to violence'" (Crump 1994, 29 Ga. L. Rev. 1+). This test is fundamental to understanding what speech is protected by groups who advocate the violent overthrow of the government – or related themes.

The O'Brien Test

In *United States* v. *O'Brien*, 391 U.S. 367, 88 S.Ct. 1673, 1968 U.S. LEXIS 2910, 20 L.Ed.2d 672 (1968), the Court set forth a four-part test to apply the Free Speech clause in certain cases regarding the government's legitimate power to regulate speech. Three of the four parts are unrelated to this inquiry. The third part, though, of this test holds that the government's interest must be unrelated to the suppression of expression (Rhoad, 1999).

Ideological Rhetoric (Hate Speech and Advocacy)

Hate speech in the United States is on the rise, according to author Susan Tolchin (1999). Tolchin further asserts that "[s]ome extremist elements now occupy the center of American politics, allowing hate speech to flourish often without the barest minimum of public opprobrium" (1999, 98). "Hate speech" and "advocacy" must be defined because "as [the] millennium [has] approache[d], freedom of speech has assumed a central role in constitutional issues" (Reed 1997, 35 Am. Bus. L.J. 1+).

Professor Edward J. Eberle defines hate speech as the "expression (and behavior) virulently and viciously directed at persons on account of their race, color, creed, gender or other status" (1994, 29 Wake Forest L. Rev. 1135+). Professor Mari J. Matsuda goes even further than Eberle in defining hate speech. She recognizes three elements of hate speech as inherently racist: [(1)] The message is of racial inferiority; [(2)] The message is directed against a historically oppressed group; and [(3)] The message is persecutorial, hateful, and degrading" (87 Mich. L. Rev. 2320+).

"Ideological" is defined by *Merriam-Webster's Collegiate Dictionary* as "[(1):] relating to or concerned with ideas" (1993, 575). *The American Heritage College Dictionary* (*TAHCD*) (1997, 1170) defines "rhetoric" as [(3.a.)] A style of speaking or writing, esp. the language of a particular subject: *political rhetoric* ... [(4)] Verbal communication; discourse. For the purpose of this inquiry, "ideological rhetoric" is defined as the verbal communication or discourse of some idea or belief system held to be true by the group/individual espousing the thought(s).

Advocacy is "[t]he act of pleading or arguing in favor of something, such as a cause; active support" (*TAHCD* 1997, 20). Thus, an advocate is someone who pleads or argues in favor of a cause.

Commentary on the Free Speech Clause: Advocacy and Hate Speech

The evolution of Supreme Court decisions regarding advocacy and hate speech has changed over time. Most glaring, perhaps is the shift from the opposition of political dissenters (namely communists in *Gitlow* and *Dennis*) to preferring relatively free ideological discussion. In the latter, the Court moved to expand the speech of political activists and hate speeches (e.g., *Terminiello*, *Brandenburg*, and *R.A.V.*).

In *Gitlow* v. *New York* (See Appendix A), the Court upheld that mere information dissemination by Defendant represented a "clear and present danger" towards the Government of the United States. However, it is important to note that the Court, in the 1920s, forced Defendant to disprove the statute as constitutionally applicable instead of today's doctrine that the burden of constitutionality is generally placed upon the State (Rhoad 1999, lecture). The Supreme Court would not likely uphold such a conviction today because of the test set forth in *Brandenburg* v. *Ohio*, *supra*. With the end of the Red Scare, the Court has been increasingly willing to allow ideological discord. Thus, with the Court's *per curiam* decision in *Brandenburg*, "*Gitlow* has been completely undercut, or rather abandoned, by [these] later cases" (Bork 1990, 223).

In *Terminiello* v. *Chicago* (See Appendix B), Petitioner's words passed both the "fighting" words and "clear and present danger" tests. Terminiello's discourse, as held by the Court, simply invited dispute and therefore did not represent a clear and present danger to government. The decision in *Terminiello* is more representative of the Court's modern interpretation of the "clear and present danger" test; that the speech must directly incite lawlessness and a likelihood that the action would be carried out.

In *United States* v. *Dennis* (See Appendix C), the Supreme Court determined that conspiring to organize, teach, and then advocate the overthrow of the U.S. Government in itself represented a "clear and present danger." Thus, the "clear and present danger" test "took a new direction" with *Dennis* (Crump 1994, 29 Ga. L. Rev. 1+). The Court subsequently "modified the test to ask a question that was more malleable than ever: 'Whether the gravity of the [violent overthrow of the government], discounted by its improbability, justified such an invasion of free speech as is necessary to avoid the danger" (Crump 1994, 29 Ga. L. Rev. 1+).

The same historical disposition of *Dennis*, however, applied in *Terminiello*. The United States was in the midst of the Cold War, and any speech or advocacy having to do with Communism was subjected to serious question. Today, the Court would have looked at the sedition act with greater scrutiny. With the exception of *Dennis*, "since the early 1950s, there has been an aggressive expansion of [F]irst [A]mendment protections for offensive political communications" (Goldberger 1991, 56 Brooklyn L. Rev. 1165+).

It is important to note the fact that there was not any evidence to lead the Court to believe the achievement of such grandiose objectives (i.e., the *actual* violent dismantling of the Government of the United States) could have occurred nullified the "improbability" doctrine set forth in *Dennis*. Thus, in *Brandenburg*, the Court would set a final "clear and present danger" test that would be partly predicated upon the likelihood of achievement of the incited advocacy.

The *Brandenburg* decision made clear that the modern interpretation of the "clear and present danger" test was applicable to the "advocacy of the use of violence being constitutionally protected unless it incited lawless action" (Ducat 1996, 951). The most important aspect of the decision in *Brandenburg* is that "[a] speaker can be held responsible for his own utterances, but not for the countless possibilities that violence may ensue when the words are interpreted by unknown persons at an indefinite time in the future" (Crump 1994, 29 Ga. L. Rev. 1+).

In *R.A.V.* v. *St. Paul* (See Appendix E), the Court found that content-based discrimination does not withstand First Amendment scrutiny. Also, *R.A.V.* failed the third tenet of the *O'Brien* test. Hence, "unlike the rigid 'clear and present danger' [test] ..., which would invalidate almost all content-neutral restrictions, the Court's analysis does not sacrifice legitimate governmental interests when significant [F]irst [A]mendment interests are not at issue" (Schultz 1999, 41 Ariz. L. Rev. 573+). The Court found that the statute in question was related to the suppression of expression and thus held to be unconstitutional.

The *R.A.V.* decision allowed the Court "to continue its expansion of the First Amendment ['s Free Speech clause] by determining that under certain circumstances the amendment will protect even hate speech constituting fighting words, a category of expression historically [constitutionally] unprotected" (Eberle 1994, 29 Wake Forest L. Rev. 1135+). The Supreme Court has "carved out public discourse as a presumptively protected realm of activity, immune from governmental regulation unless justified by such exigent circumstances"; none of which are present in *R.A.V.* (Eberle 1994, Wake Forest L. Rev. 1135+).

Conclusion

It is therefore concluded that advocacy is generally protected speech. When statutes have attempted to deprive persons of their First Amendment right, "judicial response has usually been unenthusiastic … Most … rulings have concluded that even the most deeply offensive public statements are protected" under the Free Speech clause (Goldberger 1991, 56 Brooklyn L. Rev. 1165+). The various judicially made tests previously outlined do not wholly define a "generally accepted view of when [speech] regulation is legitimate" (Heyman 1998, 78 B.U.L. Rev 1275+). The Supreme Court's "half-century-long struggle with 'clear and present danger' illustrates the faultiness of trying to find one speech test to fit all situations" (Ducat 1996, 954).

Henry Louis Gates concludes that "[i]f free speech can be tested and upheld to protect even Nazi speech, 'then the precedent will make it that much stronger in all the less obnoxious cases'" (Delgado and Yun 1995, 27 Ariz. St. L.J. 1281+). Anthony Griffin is an African American attorney who was essentially fired from his position with the Texas National Association for the Advancement of Colored People (NAACP) in lieu of defending a KKK organization. Griffin was quoted as saying that the Klan:

> says some vile and vicious and nasty and ugly things. But the Klan has a right to say them. If you ask whether they have a right to organize, to assemble, to free speech, those people have a right, and we just can't get around that. Because if you take away their [First Amendment] rights, you take away my rights also. [Further,] [i]t's very easy to give the First Amendment to groups we like and [that] make us feel good. It's very difficult to apply those principles to people who anger us, that we want to shut up … But the First Amendment is not there to protect me from you – but us from the government … If you start taking away First Amendment rights from the Klan, for instance, we as black folks will be the next to suffer. That law silencing them will come around to silence us. (Hentoff 1998, 20, 19).

Not all who have voiced interest in this First Amendment issue have echoed Griffin and the ACLU's interpretation of the Free Speech clause. Delgado and Stefancic claim that "[t]he injury – of being muffled when one would otherwise wish to disparage, terrorize, or burn a cross on a black family's law – is now depicted as a prime constitutional value" (1999, 64). The Court's current Free Speech holdings are the equivalent to "reciprocal injury" of the headway minority rights received from the Court during the "gallant struggle for civil rights" of the 1960s (Delgado and Stefancic 1999, 63). However, "properly drafted hate-speech codes may well be found constitutional" if law-writing bodies can compose content-neutral legislation that can pass the Court's judge-made "mechanical doctrines and 'tests'" (Delgado and Yun 1995, 27 Ariz. St. L.J. 1281+).

Free speech in the United States is relatively free from government suppression unless the "advocacy (1) … [is] directed to inciting or producing imminent lawless action and (2) [is] likely to incite or produce such action" (Crump 1994, 29 Ga. L. Rev. 1+). Thus, the free and open dialogue in this country on various political and social issues shall remain sacrosanct due to its protection by the U.S. Supreme Court.

References

American Heritage College Dictionary, The (1997). Boston, MA: Houghton Mifflin Company.

Bork, Robert H. (1990) "Neutral Principles and Some First Amendment Problems." Jack N. Rakove (Ed.), *Interpreting the Constitution: The Debate over Original Intent* (pp. 197-226). Boston, MA: Northeastern University Press.

Cox, Richard H. (1998). *Four Pillars of Constitutionalism: The Organic Laws of the United States*. Amherst, NY: Prometheus Books.

Crump, David (1994) Camouflaged Incitement: Freedom of Speech, Communicative Torts, and the Borderland of the Brandenburg Test. *Georgia Law Review*, 29, 1+. November 3, 1999 from the LEXIS-NEXIS on-line database (29 Ga. L. Rev. 1).

Delgado, Richard and Stefancic Jean (1999). "Hate Speech Is a Serious Hate Crimes Problem." T.L. Roleff, Brenda Stalcup, and M.E. Williams (Eds.), *Hate Groups: Opposing Viewpoints* (pp. 57-64). San Diego, CA: Greenhaven Press.

Delgado, Richard and Yun, David (1995) "The Speech We Hate": First Amendment Totalism, the ACLU, and the Principle of Dialogic Politics. *Arizona State Law Journal*, 27, 1281+. November 7, 1999 from the LEXIS-NEXIS on-line database (27 Ariz. St. L.J. 1281).

Ducat, Craig R. (1996). *Constitutional Interpretation*. Minneapolis/St. Paul, MN: West Publishing Company.

Dworkin, Ronald (1996). *Freedom's Law: The Moral Reading of the American Constitution*. Cambridge, MA: Harvard University Press.

Eberle, Edward J. (1994) Hate Speech, Offensive Speech, and Public Discourse in America. *Wake Forest Law Review*, 29, 1135+. November 3, 1999 from the LEXIS-NEXIS on-line database (29 Wake Forest L. Rev. 1135).

Goldberger, David (1991) Sources of Judicial Reluctance to use Psychic Harm as a Basis for Suppressing Racist, Sexist, and Ethnically Offensive Speech. *Brooklyn Law Review*, 56, 1165+. November 7, 1999 from the LEXIS-NEXIS on-line database (56 Brooklyn L. Rev. 1165).

Hentoff, Nat (1998). *Living the Bill of Rights: How to Be an Authentic American.* New York, NY: Harper Collins Publishers.

Heyman, Steven J. (1998) Righting the Balance: An Inquiry into the Foundations and Limits of Freedom of Expression. *Boston University Law Review*, 78, 1275+. November 7, 1999 from LEXIS-NEXIS on-line database (78 B.U.L. Rev.).

Mannheimer, Michael J. (1993) The Fighting Words Doctrine. *Columbia Law Review*, 93, 1527+. November 3, 1999 from the LEXIS-NEXIS on-line database (93 Colum. L. Rev. 1527).

Marcuse, Herbert (1999) "From 'Repressive Tolerance.'" Milton Heumann and Thomas W. Church (Eds.), *Hate Speech on Campus: Cases, Case Studies, and Commentary* (pp. 263-268). Boston, MA: Northeastern University Press.

Massey, Calvin R. (1992) Hate Speech, Cultural Diversity, and the Foundational Paradigms of Free Expression. *UCLA Law Review*, 40, 103+. November 3, 1999 from the LEXIS-NEXIS on-line database (40 UCLA 103).

Matsuda, Mari J. (1989) Legal Storytelling: Public Response to Racist Speech: Considering the Victim's Story. *Michigan Law Review*, 87, 2320+. November 4, 1999 from the LEXIS-NEXIS on-line database (87 Mich. L. Rev. 2320).

Merriam-Webster's Collegiate Dictionary (1993). Springfield, MA: Merriam-Webster, Incorporated.

Mill, John Stuart (1991). *On Liberty.* William Ebestein and A.O. Ebenstein (Eds.), *Great Political Thinkers: From Plato to the Present* (pp. 650-675). Fort Worth, TX: Harcourt Brace College Publishers.

Reed, O. Lee (1997) A Free Speech Metavalue for the Next Millennium: Autonomy of Consciousness in the First Amendment Theory and Practice. *American Business Law Journal*, 35, 1+. November 7, 1999 from the LEXIS-NEXIS on-line database (35 Am. Bus. L.J. 1).

Rhoad, Dennis J. (1999). Course Lecture, PSCI 462 – Constitutional Law: Civil Rights and Liberties. The Citadel, Charleston, SC. March 17, 1999.

Schultz, Christopher M. (1999) Therapeutic Jurisprudence: Content-Based Restrictions on Free Expression: Reevaluating the High Versus Low Speech Distinction. *Arizona Law Review*, 41, 573+. November 7, 1999 from the LEXIS-NEXIS on-line database (41 Ariz. L. Rev. 573).

Schwartz, Bernard (1993). *A History of the Supreme Court.* New York, NY: Oxford University Press.

Tolchin, Susan J. (1999). *The Angry American: How Voter Rage Is Changing the Nation.* Boulder, CO: Westview Press.

A. Appendix A

Gitlow v. New York
Supreme Court of the United States, 1925
268 U.S. 650, 45 S.Ct. 625, 1925 U.S. LEXIS 598, 69 L.Ed. 1138

SUBSTANTIVE AND PROCEDURAL FACTS

Gitlow (defendant) was the leader of the Left Wing Section of the Socialist party. Defendant was convicted of violating a New York state law that "punished advocating the overthrow of the government by force and violence" (Ducat 1996, 926). Specifically, the indictment against Defendant was the publishing and distribution of "The Left Wing Manifesto" – where Gitlow had "advocated, advised, and taught 'the doctrine that organized government should be overthrown by force, violence, and unlawful means'" (Ducat 1996, 926). Interestingly, "[t]here was no evidence that the publication of the manifesto had any effect" in its ability to actually succeed in the 'illegal' task the speech set forth (Ducat 1996, 926). The Supreme Court took up the case on *certiorari* from the New York Court of Appeals.

ISSUE

Whether the statute (that Defendant was charged with and subsequently convicted of) "by its terms and as applied in this case, is repugnant" to the Free Speech Clause of the First Amendment.

HOLDING AND ANALYSIS

The manifesto at issue "advocates and urges in fervent language mass action which shall progressively foment industrial disturbances and through political mass strikes and revolutionary mass action overthrow and destroy organized parliamentary government." The Court further determined that the "[f]reedom of speech and press … does not protect disturbances to the public peace or the attempt to subvert the government."

Therefore, "dangerous utterances" may be punished under the New York statute because "utterances inciting to the overthrow of organized government by unlawful means, present a sufficient danger of substantive evil to bring their punishment within the range of legislative discretion." Furthermore, the "question [in this case] is whether the words used are used in such circumstances and are of such a nature as to create a clear and present danger that they will bring about the substantive evils." The Court found that "substantive evils" were reached by the wording of the manifesto and therefore represented a clear and present danger. Defendant's conviction was upheld.

Appendix B

Terminiello v. Chicago, Illinois
Supreme Court of the United States, 1949
337 U.S. 1, 69 S.Ct. 894, 1949 U.S. LEXIS 2400, 93 L.Ed. 1131

SUBSTANTIVE AND PROCEDURAL FACTS

Terminiello (Petitioner) was charged with "disorderly conduct when he was arrested for violating Chicago's 'breach of the peace' ordinance'" (Ducat 1996, 934). He spoke to an auditorium of roughly 800 people – populated mostly by supporters. However, outside the auditorium, "a hostile crowd approximately double the size of the [crowed in the meeting hall] angrily milled about, protesting the meeting" (Ducat 1996, 934).

Petitioner actively chastised members of the Franklin D. Roosevelt administration along with specific racial groups. Pushing and shoving ensued outside the auditorium – "rocks were thrown, 28 windows were broken, stink bombs were set off, and there were efforts to break in through the back door of the meeting hall" (Ducat 1996, 934). Petitioner was fined one-hundred dollars by a jury. At trial, Terminiello claimed he was protected by his guarantee of free speech. The Illinois Supreme Court, however, upheld the conviction, and the U.S. Supreme Court took the case up for review.

ISSUE

"Whether the content of [P]etitioner's speech was composed of derisive, fighting words, which carried it outside the scope of [the] constitutional guarantees" envisioned in the First Amendment's Free Speech Clause.

HOLDING AND ANALYSIS

The Court held that the function of free speech "best serves its high purpose when it induces a condition of unrest, creates dissatisfaction with conditions as they are, or even stirs people to anger." Further, the Court held that free speech "is nevertheless protected against censorship or punishment, unless shown likely to produce a clear and present danger of a serious substantive evil that rises far above public inconvenience, annoyance, or unrest." Here, Terminiello's speech did not represent a clear and present danger because it merely provoked 'public unrest.' The conviction here was overturned.

Appendix C

Dennis v. United States
Supreme Court of the United States, 1951
341 U.S. 494, 71 S.Ct. 857, 1951 U.S. LEXIS 2407, 95 L.Ed. 1137

SUBSTANTIVE AND PROCEDURAL FACTS

The Smith Act (officially known as the Alien Registration Act of 1940) was the first peacetime Congressional act of its kind since the Sedition Act of 1798 (Ducat, 1996). Essentially, the Act made illegal "various speaking, writing, and associational activities of resident aliens and American citizens" (Ducat 1996, 939). The statute was generally used against members of the Communist party that operated within the United States.

Amidst the 'McCarthy Hearings,' Eugene Dennis (defendant and one of the several top-ranking members of the American Communist Party) was named in the Government's indictment for violating the Smith Act. Defendant and several of his associates were charged with the following:

> willfully and knowingly conspiring (1) to organize as the Communist Party of the United States of America a society, group and assembly of persons who teach and advocate the overthrow and destruction of the Government of the United States by force and violence, and (2) knowingly and willfully to advocate and teach the duty and necessity of overthrowing and destroying the Government of the United States by force and violence (Ducat 1996, 940).

A jury found Defendants guilty of violating Smith, and the U.S. Court of Appeals for the Second Circuit upheld the decision. The Supreme Court took *Dennis* up for review.

ISSUE

"Whether … the relevant positions of the Smith Act infringed freedom of speech as protected by the First Amendment['s]" Free Speech Clause.

HOLDING AND ANALYSIS

The majority opinion authored by Chief Justice Fred M. Vinson found that "[t]he obvious purpose of the [Smith Act] is to protect existing Government, not from peaceable, lawful and constitutional means, but from change by violence, revolution and terrorism. That it is within the *power* of the Congress to protect the Government of the United States from armed rebellion is a proposition which requires little discussion." The Court went on to illustrate that "a conviction relying upon speech or press as evidence of violation may be sustained only when the speech or publication created a 'clear and present danger' of attempting or accomplishing the prohibited crime."

Thus, the Court found that the advocacy for the "[o]verthrow of Government by force and violence is certainly a substantial enough interest for the Government to limit speech." Furthermore, the Court held that "[s]peech is not an absolute, above and beyond control by the legislature when its judgment, subject to review here, is that certain kinds of speech are so undesirable as to warrant criminal sanction." Ergo, the Justices held that the Act did not "inherently, or as construed or applied [in *Dennis*], violate" the Free Speech Clause.

Appendix D

Brandenburg v. Ohio
Supreme Court of the United States, 1969
395 U.S. 444, 89 S.Ct. 1827, 1969 U.S. LEXIS 1367, 23 L.Ed.2d 430

SUBSTANTIVE AND PROCEDURAL FACTS

Brandenburg (defendant), a local leader of a KKK group, was convicted under the Ohio Criminal Syndicalism Act for:

> advocat[ing] … the duty, or propriety of crime, sabotage, violence, or unlawful methods of terrorism as a means of accomplishing industrial or political reform' and for 'voluntarily assembl[ing] with any society, group, or assemblage of persons formed to teach or advocate the doctrines of criminal syndicalism (Ducat 1996, 949).

At the defendant's request, a Cincinnati television station filmed the events. The first film showed by the prosecution at trial showed Brandenberg claiming that "if the President, Congress, and the [Supreme] Court continued to 'suppress the white, Caucasian race, it's possible that there might have to be some revengeance taken'" (Ducat 1996, 949).

Both films showed hooded men, while some holding firearms (although Defendant did not). The second film showed by the prosecution displayed Defendant stating "[p]ersonally, I believe the nigger should be returned to Africa, the Jew returned to Israel" (Heumann and Church 1999, 59).

Upon his conviction, Brandenburg appealed the constitutionality of the Ohio statute against the First and Fourteenth Amendments. However, the Ohio appellate court upheld the conviction, and the state supreme court denied Defendant's request for *certiorari*. The U.S. Supreme Court, however, agreed to hear the case.

ISSUE

Whether the Ohio Criminal Syndicalism Act which fails to draw a distinction between (1) the mere advocacy; and (2) incitement to eminent lawlessness violates the First Amendment's Free Speech Clause.

HOLDING AND ANALYSIS

The Court held that "'the mere abstract teaching of the moral propriety or even moral necessity for a resort to force and violence, is not the same as preparing a group for violent action and steeling it to such action." Thus, "[a] statute that fails to draw this distinction impermissibly intrudes upon the freedoms guaranteed by the First and Fourteenth Amendments." Specifically:

> [t]he Act punishes persons who 'advocate or teach the duty, necessity, or propriety' of violence 'as a means of accomplishing industrial or political reform'' or who publish or circulate or display any book or paper of such advocacy ; or who 'justify' the commission of violent acts 'with intent to

> exemplify, spread or advocate the propriety of the doctrines of criminal syndicalism'; or who 'voluntarily assemble' with a group formed to teach or advocate the doctrines of criminal syndicalism (Ducat 1996, 950).

Thus, the Court found that the statute "by its own words and as applied, purports to punish mere advocacy and to forbid, on pain of criminal punishment, assembly with others merely to advocate the described type of action." Brandenburg's conviction was reversed.

Appendix E

R.A.V. v. City of St. Paul, Minnesota
Supreme Court of the United States, 1992
505 U.S. 377, 112 S.Ct. 2538, 1992 U.S. LEXIS 3862, 120 L.Ed.2d 305

SUBSTANTIVE AND PROCEDURAL FACTS

R.A.V. (Petitioner) allegedly burned a cross on an African American family's lawn. Petitioner was charged and convicted under the St. Paul Bias-Motivated Crime Ordinance. The ordinance states that anyone "display[ing] of a symbol which one knows or has reason to know 'arouses anger, alarm or resentment in others on the basis of race, color, creed, religion or gender commits disorderly conduct and shall be guilty of a misdemeanor'" (Ducat 1996, 1027).

The trial court found the statute in question overly broad; however, this initial finding was overruled. The State Supreme Court "rejected the overbreadth claim because the phrase 'arouses anger, alarm or resentment in others' had been construed in earlier state cases to limit the ordinance's reach to 'fighting words' within the meaning of" the Supreme Court's finding in *Chaplinsky*. The Minnesota Supreme Court further "concluded that the ordinance was not impermissibly content-based because it was 'a narrowly tailored means toward accomplishing the compelling governmental interest in protecting the community against bias-motivated threats to public safety and order'" (Ducat 1996, 1027).

The U.S. Supreme Court took up *R.A.V.* on review from the State Supreme Court under a writ of *certiorari*.

ISSUE

Whether the ordinance is facially valid under the Free Speech Clause of the First Amendment.

HOLDING AND ANALYSIS

Justice Antonin Scalia's majority opinion stated that the Court "conclude[d] that the ordinance is facially unconstitutional in that it prohibits otherwise permitted speech solely on the basis of the subjects the speech addresses." Further, "with fighting words: The government may not regulate use based on hostility – or favoritism – towards the underlying message expressed."

The Court additionally asserted that "[i]t is obvious that the symbols which will arouse 'anger, alarm or resentment in others on the basis of race, color, creed, religion or gender' are those symbols that communicate a message of hostility based on … characteristics." Such an application of the ordinance is tantamount to content-discrimination and therefore is unconstitutional. What the Court faced in this decision "[was] … a prohibition of fighting words that contain … messages of 'biasmotivated' hatred and in particular, as applied to this case, messages 'based on virulent notions of racial supremacy.'

Thus, St. Paul's interest in limiting the speech of what the city council deems "special hostility" is singled out. This exact action "is precisely what the First

Amendment forbids. The politicians of St. Paul are entitled to express that hostility – but not through the means of imposing unique limitations upon speakers who (however benightedly) disagree." The majority opinion concluded "that burning a cross in someone's front yard is reprehensible. But St. Paul has sufficient means at its disposal to prevent such behavior without adding the First Amendment to the fire." The Court found the statute unable to withstand Free Speech Clause muster, and the finding of the Minnesota Supreme Court was overturned.

Robert Frost's Search for Love

Robert Joseph Sexton

R. Joseph Sexton, from Guatemala City, Guatemala, is a member of the Class of 2001 and majors in English. After graduation, he plans to attend graduate school, teach English, and write. His paper was written for Dr. Tony Redd's class in 20th Century American Poetry and Drama. After reading this paper, one gains a better understanding about love between human beings. Joseph's paper is first, and the poems are directly after.

Man's existence is littered with the bones of those who have fought to climb the highest reaches of understanding. Some have realized their summits and found inner peace and satisfaction. Others have found the answers to one question, only to stand upon their new knowledge and, for the first time, catch a glimpse of a higher peak carefully hidden on the horizon behind their first mountain. Upon close examination of this landscape, it becomes apparent that one mountain stands above all its lofty brethren. Alone it reigns, shrouded in mist and mystery. Robert Frost was well acquainted with this mysterious pinnacle of wisdom, upon which rests true understanding of love. He spent an entire lifetime trudging up the sides of cliffs in a desperate struggle to find the love he had always sought with his wife. Many poems were inspired by this life-long struggle. Many of these are shrouded in imagery and remain mysterious. "The Silken Tent" is an example of a Robert Frost love poem. On the surface, it might appear to be a simple single-sentence sonnet describing the delicate beauty that is feminine consciousness. Carefully laid beneath the blanket of imagery, though, Frost places a dark statement concerning the unpredictability of women and their constant, paradoxical struggle against the bonds that secure them to the earth. Frost also recognizes the boulders that block men's path towards love. Highest among the stumbling places common to man is the constant struggle between desire for sexual gratification and the search for divine unity between man and woman. Frost illustrates the depravity of lust in "The Subverted Flower." These two poems together tell how men have consistently failed in their attempts to unravel the tangle of a woman's mind and thus stumble over moral weaknesses in their quest for a meaningful relationship, and thereby he paints a picture of the allusive concept of love.

From its beginning, the Frost marriage was marred by strife and tragedy. Frost had met Elinore White at his high school in Lawrence, Massachusetts. In fact, the two were co-valedictorians of their class. The young poet was smitten by Elinore. Unfortunately, though, the feeling was not mutual, and in the end Robert almost pressured the young woman into marriage. Elinore never seemed happy with her marriage; it almost seems as though for unknown reasons, Elinore always regretted allowing herself to be persuaded into marriage. The couple had five children within a ten-year period. Out of these five, though, only one did not die at a relatively young age. One child died at childbirth, one passed away at the age of four of cholera. Frost's daughter died at the age of thirty and his only son committed suicide. In 1938, Elinore died of a heart attack while wintering in Gainesville, Florida. These tragedies, combined with an unhappy marriage, were reflected in Frost's love poetry. Robert Frost knew well the beautiful ideal of love. His lyrical genius allowed him to convey the beauty of this ideal into words. True love always seemed to elude this great American poet, however, and if a reader digs deeply enough into his poetry, this fact clearly presents itself. In "The Silken Tent," Frost illustrates beautifully the delicacy of a woman's maturation. Underlying the beauty of the words, though, is a darker theme that suggests unpredictability in women's attitudes towards relationships.

A summer's field through which a breeze whispers softly across the grass is where Frost begins his sentence-long examination of a woman's being. This soft image immediately suggests delicacy and fragility. Moreover, the tent itself is not constructed from a common tent's usual coarse material. The title itself lets the reader know that this tent is no ordinary tent. It is in fact "The Silken Tent," the female of the species. This tent basks in the glory of a midday sun and has established itself as a presence in life's field. The woman has reached full maturity and is confident in her womanhood: "…a sunny summer breeze/ Has dried the dew and all its ropes relent (Frost 331)." All of the dew, the awkwardness of womanly awakening has dried off and now this woman is able to sway confidently in the midst of men, "…in guys it gently sways at ease. (Frost 331)" Frost teases the reader here with his use of the word "guys," and it is plausible to suggest that he is calling the reader's attention to a possible façade worn by this woman. Perhaps the woman in *guise* finds comfort in the presence of men. This play-on-words offers a foretaste of the underlying theme found in this gentle verse.

Continuing with the description of a woman at the height of maturity, in the midday of her life, and basking in the gentle summer breezes, Frost calls attention to the inner construction of the tent itself. The tent is supported by a "…central cedar pole" that, according to Frost, "…signifies the sureness of the soul" (Frost 332). The woman would like to believe that all credit to her form, her gentle but firm presence in the field, is owed to her own development as a human being and to her spiritual progression. In this blueprint of woman's soul the poet introduces the reader to the conflict in the poem, and it is at this point that Frost first alludes to the mysterious bonds of love and relationship.

As with any human body, the tent has a skeletal system of support that is the "central cedar pole," but what gives the tent significance and form is the silk itself. The natural progression of outlining the inner-workings of a woman's being would lead to an inquiry as to where the silk originates. In other words, the silk's connection to the cedar pole must be established. Does the silk spring forth from the pole as do branches from a tree? Herein lies the main thrust of Frost's proposal that the woman's essence is a direct result of her relationships, more specifically, her love relationships. Frost points out that the body of the tent, the silk, is attached to the supporting pole by "…countless silken ties of love and thought" (Frost 332). The woman is, therefore, as the saying goes, no island unto herself. What gives the woman form is not her individuality, manifested through the supporting beam, but in fact her ties to others. Therefore, these bonds paradoxically allow the woman to establish herself as an independent structure, or individual, in the summer field. The conflict lies in woman's reaction to these binding relationships and her acceptance of the ties as the source of her essence. The woman's attitude suggests denial. The ties themselves are made of silk, instead of an uncomfortable fabric that would force a woman to admit not only to the presence but also to the purpose of the bonds. Frost's portrait of this woman does not acknowledge the fact that her beautiful, delicate form is owed to the manner in which she deals with loving relationships. More importantly, though, she herself does not recognize that the source of her well being and her security is found in those to whom her soul is bound. The woman has allowed her ropes or bonds to hang loose about her soul, never allowing herself complete immersion into the depths of love by securely and consciously fastening her love to her soul. Instead, only by a disturbance in her otherwise serene existence does she recognize her need for love.

Robert Frost's focus on a woman's role in love relationships in "The Silken Tent" sharply contrasts with his focus on man's pursuit of love and the obstacles he encounters in the poem "The Subverted Flower." Frost claimed to have written this poem in time for it to be included in his first published volume of poems, *A Boy's Will* (1913), but he waited until after Elinore Frost's death in 1938 to include this sexually revealing poem in his 1942 book *A Witness Tree*. It seems as though the poem was too biographical in nature for Frost to have published at any time while his wife was still alive, given the consistently fragile nature of his marriage bond. Frost graduated from high school in 1892, very much in love with Elinore already. The summer of 1892 was a trying time for both him and Elinore. Both were well aware that collegiate aspirations barred any plans for marriage. Frost remained passionate in the pursuit of the love of his life, but it seems that Elinore's attitude frustrated him during this time. It is in direct regard to this time of relational and sexual crisis in Robert Frost's life that "The Subverted Flower" seems to have been written. In broad scope the poem deals with the issue of lust and how damaging it can be in a love relationship. Again, Frost fools the reader into taking the poem at face value, merely as an illustration of how sexual lust transform men into beasts. The reader is forced to dig deeper for the story hidden behind the obvious, though, and what the reader finds is a man attempting to express his love and desire for a girl, only to be rewarded by his lover with frigidity and spite.

Frost begins this uncomfortable poem by illustrating the stark contrast between the young man and the young woman. The man remains calm while the young lady pulls herself away. This "pulling away" is a key element idea in the poem and presents itself not only in the opening, but also in the closing of the poem. This young woman reduces her lover to the state of beast and sees only bestial impulses in his passionate probes for love. The young man has taken a "tender-headed flower" in his hand in the beginning of the poem. Frost uses the flower in two ways: one shows the girl as a flower, and the other illustrates the boy's use of the blossom. It seems as though the poet makes an effort to emphasize the girl's perception of the flower as a vulgar representation of the male reproductive organ. The reader is fooled into actually believing that the man is handling his own tender-headed flower, in a jovial, perverted manner. While it is historically true that men fall victim to the demon of lust that lurks along the darker edges of the path leading to a mutual love relationship, it is evident in this poem that lust is not a primary motive of the boy. This intended deception allows the reader to experience how grossly the man's petitions for physical tenderness were misinterpreted and after careful examination of the poem the reader can sympathize with the frustration the man feels towards the object of his affection.

Throughout the poem the young woman is skirting carefully around and away from her lover. She dares not move for fear of waking the lustful animal "that slumbers in a brute" (Frost 340). This woman is so caught up in her fears and presumptions that she fails to listen to her lover's words. She does not hear his tender utterances that would most likely reveal his honest intentions. All she sees is a beast choking on his words "Like a tiger at a bone" (Frost 340), only able to associate her lover with a beast. In fact, it seems as though the young man is trying to convey his love for this young woman with his inquiring statement of "if this has come to us/ And not to me alone." It is interesting to suppose that "this" refers to love and to note at the same time, that Frost carefully rhymed every line in the poem, with the exception of only the two lines in which love is alluded to. This suggests that the love in the relationship was not mutual.

After seeming to establish the fact that the young man is, in essence, nothing more than a beast in the eyes of his supposed lover, Frost turns the poem completely around. At this point the poet gives the reader an entirely different interpretation of the reality concerning this relationship and the nature of the two characters. The first hints of a general shift in the nature of the characters appear with the introduction of the girl's mother. At this point the reader discovers that these two hidden lovers meet under the cover of darkness and secrecy at the time of the poem. The voice of her mother's searching call in the night brings the two lovers back to a sober state of reality. The man's use of the flower as a petition for affirmation of love through physical contact becomes a significant factor in the shifting of perspectives in the poem. Frost points out that in the eyes of the young woman, this flower, this symbol, of love has damaged her view of the boy. Instead of interpreting the man's pursuits as romantic and passionate, she perceives them to be base and primitive. The poet does not leave the reader with the idea that the flower alone "marred" the man, though, and in completing the shift states that "...what the flower had done but part/ And what the flower began/ Her own too meager heart/ Had terribly completed" (Frost 340-341). In other words, the woman's own warped sense of reality had created a beast out of her lover. The man decided to flee rather than face an encounter with the young woman's mother. The realization of the horror of the situation sent the woman into an all too real animalistic rage. Concluding the poem with the woman characterized as an animal herself suggests that Frost meant for the truth of the matter to lie in the conclusion of the poem. The young man's desperate attempts for love were, in fact, human and not some primal instinct, as the young woman's perception would suggest. Frost opened the poem with the young woman distancing herself from the man; he concludes the poem by completing this distancing by leaving the reader with an image of the girl being drawn home by her mother.

Robert Frost understood the general nature of love. He knew the beauty and delicacy associated with a woman's love, but he knew all too well the elusiveness of this ideal. Throughout his long life he was constantly tortured by the fact that the only woman he loved seemed to regret ever having agreed to marriage. The silken ties bound to Mrs. Frost's soul were bound in such a loose manner that Frost seemed to question whether or not there were ever any ties there in the first place. Frost's passion for life is immediately detectable to the most casual students of his poetry. This passion is what seemed to hold Frost together. The fact that he would stumble so often and fall so hard in his attempts to scale the peak whereupon he would find the answers to every question concerning love that the great poet could conceive is evidence of this passion. Despite the fact that his wife died long before he, Frost never gave up his quest. Frost was halted only by the indiscriminate hand of time. It seems that with the right pair of eyes one can see the dusty bones of Robert Frost high up on the misty mountain, reaching towards

heaven in one final earthly attempt to explain the greatest and most beautiful of experiences, love between a man and a woman.

"The Silken Tent"
By Robert Frost

She is as in a field a silken tent
At midday when a sunny summer breeze
Has dried the dew and all its ropes relent,
So that in guys it gently sways at ease,
And its supporting central cedar pole,
That is its pinnacle to heavenward
And signifies the sureness of the soul,
Seems to owe naught to any single cord,
But strictly held by none, is loosely bound
By countless silken ties of love and thought
To everything on earth the compass round,
And only by one's going slightly taught
In the capriciousness of the summer air
Is of the slightest bondage made aware.

"The Subverted Flower"
By Robert Frost

She drew back; he was calm:
"It is this that had the power."
And he lashed his open palm
With the tender-headed flower.
He smiled for her to smile,
But she was either blind
Or willfully unkind.
He eyed her for a while
For a woman and a puzzle.
He flicked and flung the flower,
And another sort of smile
Caught up like fingertips
The corners of his lips
And cracked his ragged muzzle.
She was standing to the waist
In goldenrod and brake,
Her shining hair displaced.
He stretched her either arm
As if she made it ache
To clasp her-not to harm;
As if he could not spare
To touch her neck and hair.
"If this has come to us
And not to me alone----"
So she thought she heard him say;
Though with every word he spoke
His lips were sucked and blown
And the effort made him choke
Like a tiger at a bone.
She had to lean away.
She dared not stir a foot,

Lest the movement should provoke
The demon of pursuit
That slumbers in a brute.
It was then her mother's call
From inside the garden wall
Made her steal a look of fear
To see if he could hear
And would punce to end it all
Before her mother came.
She looked and saw the shame:
A hand hung like a paw,
An arm worked like a saw
As if to be persuasive,
An ingratiating laugh
That cut the snout in half,
An eye become evasive.
A girl could only see
That a flower had marred a man,
But what she could not see
Was that the flower might be
Other than base and fetid:
That the flower had done but part,
And what the flower began
Her own too meager heart
Had terribly completed.
She looked and saw the worst.
And the dog or what it was,
Obeying bestial laws,
A coward save at night,
Turned from the place and ran.
She heard him stumble first
And use his hands in flight.
She heard him bark outright.
And oh, for one so young
The bitter words she spit
Like some tenacious bit
That will not leave the tongue.
She plucked her lips for it,
And still the horror clung.
Her mother wiped the foam
From her chin , picked up her comb,
And drew her backward home.

All information used in the writing of this paper, save Robert Frost's poems, was taken directly from Dr. Tony Redd's lectures on twentieth century American poetry.

The Second Amendment: A Collective or Individual Right?

Shaun A. Reynolds

Shaun A. Reynolds, from La Vergne, Tennessee, is a member of the Class of 2001 and majors in political science with a focus in international politics. Upon graduation, he will serve this country as an officer in the United States Army. Shaun hopes to join the infantry. The following paper was written for Dr. John Kuzenski's Constitutional Law class. Shaun first presents a review of Supreme Court cases focusing on the Second Amendment and then presents academic arguments on both collective and individual interpretations of the Second Amendment. Finally, Shaun looks into lower court cases to determine the outcome of a modern-day Second Amendment test case.

Next to abortion rights, the Second Amendment may be the most controversial and talked about issue facing the Supreme Court. It is also the Constitutional issue most ignored by the Court- only three cases directly questioning the Second Amendment have been heard. The only one this century was well over 60 years ago. Perhaps it is due to the Court's lack of action on the subject that the issue continues to rage, particularly in the academic field. Though it may be one of the riskier subjects to take on, this paper will attempt to objectively explain the debate between the "collective/states rights" advocates, who believe the Second Amendment supports today's political trend of gun control, and "individual rights" advocates, who maintain the belief that the amendment protects the individual's right to keep and bear arms. The existing Supreme Court precedents will be explained, the key points of contention between both sides of the argument, and how recent rulings may affect a new Second Amendment case.

United States v. Cruikshank 92 U.S. 542 (1875) was the first of the Supreme Court's three decisions concerning Second Amendment rights. It involved members of a mob who were charged with infringing upon the rights of African Americans by invading a freedmen's meeting and confiscating their weapons. The defendants were charged under section 6 of the Enforcement Act of 1870, which protected recently freed slaves by preventing others from infringing upon their constitutional rights (Johnson 209). The court ruled that though the Second Amendment protects the individual's right to bear arms, it "means no more than it shall not be infringed by Congress." The Court also stated that though the Fourteenth Amendment protects citizens from state infringement from certain rights, it does not protect them from infringement by other citizens (Murley).

The next Supreme Court case concerning the Second Amendment was Presser v. Illinois 116 U.S. 252, 6S.Ct 580 (1886). Presser led a "workers' militia" of about 400 men in a parade through Chicago in response to harassment from the Illinois National Guard (Murley). He challenged an Illinois statute that banned armed militias that were not part of the Illinois National Guard or United States military services without permission from the governor (Streit 662). The Court sided with Illinois, ruling that the Constitution did not protect the right of unofficial companies of men to drill and parade and that the law "did not infringe the right of the people to keep and bear arms" (Worthen

157). Like Cruikshank, the Court ruled that the Amendment was a limit on the "power of Congress and the national government, not upon the states" (Murley).

The Court's third and final ruling on the Second Amendment came 53 years later in United States v. Miller 307 U.S. 174 (1939). This case was a result of two men, Miller and Layton, who were charged under the National Firearms Act for owning and carrying a double-barrel sawed-off shotgun across state lines. Originally when the case went to trial court, the defendants argued that their Second Amendment rights were violated under by the act because the Second Amendment protected their right to bear arms. The lower court agreed and the defendants were acquitted. The government asked for a direct ruling by the Supreme Court. The Court agreed, subsequently ruling that the defendants were not protected under the Amendment because of the nature of the weapon they possessed. It ruled that since it was not a weapon that had "some reasonable relationship to the preservation or efficiency of a well-regulated militia," then the Amendment did not protect their possession of it (Streit 663).

The Supreme Court's ruling in United States v. Miller has resulted in a large legal and political debate over the Second Amendment. Due to the fact that none of the previous Supreme Court cases have been models of clarity on the subject (even the Miller case is said to be ambiguous according to most sources), it has become apparent that the subject has not yet been solved. The debate on the political front has been mirrored on the legal front, particularly apparent in reading law reviews and journals on the subject. The majority of journal articles seem to support an individualist interpretation of the Second Amendment (Denning 728). David Harmer, writing for a Brigham Young University symposium on the subject, goes as far as to say that the "overwhelming majority of legal scholarship" agree upon the individualist viewpoint and that questions on how to interpret the amendment "have largely been answered—by academics, if not the judges" (Harmer 79, 100). Brannan P. Denning furthers this point in a Harvard journal by pointing out a Professor Glenn H. Reynolds who, in light of overwhelming support of the individualist model, has called it the "Standard Model" of Second Amendment interpretation (Denning 728).

One of the individual rights activists' main arguments lies within the wording of the Second Amendment itself. They generally conclude that the reference of "the right of the people" provides citizens the privilege of bearing arms, especially when comparing historical context of the drafting of the Bill of Rights (Johnson 198). Harmer explains in detail how James Madison drafted the amendment and how it was debated in Congress, with no mention of "the people" as a collective body encompassed by the states, as collective advocates believe. David E. Johnson, writing in the *Kentucky Law Journal*, set out to explain the "grammatical syntactic structure" of the amendment. He writes that the amendment is divided into two separate clauses, the militia portion being the subordinate clause. This argument proposes that the subordinate clause explains why the individual right must be protected- the people's right to bear arms is necessary because of the need of a militia (Johnson 200-201). Johnson concludes that if the Framers of the Constitution wanted the amendment to refer to the states and not to individual rights, then they would have chosen language that would be less confusing (Johnson 204).

The militia portion of the amendment is seen by individual right advocates as an appendage that also protects the individual's right to bear arms, when referring to the practice of militias being composed of the whole body of able-bodied men at the time of the Second Amendment's ratification. Johnson illustrates the colonial-period English practice of requiring the citizenry to keep firearms for militia, as well as policing purposes (Johnson 201-202). Sanford Levinson points out that Justice Scalia himself, writing recently in his "Tanner Lectures, A Matter of Interpretation: Federal Courts and the Law," disagreed with Professor Laurence Tribe's assertion that the second amendment was "state- militia- based" (Levinson 132). He referred to the Virginia Bill of Rights of June 1776, which defined the militia as "the body of the people, trained to arms" (Levinson 132).

Individual rights advocates argue strongly for the incorporation of the Second Amendment to the states through the Fourteenth Amendment. The argument rests on the fact that the rest of the Bill of Rights (save the third amendment, which has never seen a major challenge in court, if at all) has been incorporated to the states. This means that the rights listed are given to all the people, protected from infringement by state and local governments. They continue that the Court's rulings in United States v. Cruikshank and Presser v. Illinois should be considered invalid because they were decided before the large-scale incorporation of the Bill of Rights by the Fourteenth Amendment. Harmer points out "legislative intent" as an additional reason for incorporation. He cites Senator Howard, who reported the Fourteenth Amendment to the Senate for the Joint Committee on Reconstruction in 1866. In this address, Harmer points out Senator Howard's explanation that the first clause of the Amendment would restrain the states from infringing Constitutional rights the same as it restrained the federal government from doing the same (Harmer 75-76). Senator Howard is even quoted in mentioning "the right to keep and bear arms" as one of the fundamental rights that would be protected. But Harmer concedes that this has little weight compared to judicial action, as will be discussed later.

Many constitutional scholars believe that the lower courts have been misguided in their interpretation and usage of United States v. Miller. Individual right advocates call the Miller case too narrow in its ruling and too vague to be of real significance. Johnson contends that "The sole reason the Court refused to extend Second Amendment protection to Miller's sawed-off shotgun was that it was not a military style weapon" (Johnson 215). Denning seems to advance this idea with the fact that the federal government tried to push a collective rights argument in the prosecution of the case, but that the court seemed to take the government's "fallback position" concerning Second Amendment protection of the type of weapon possessed (Denning 733). According to individual rightists, this at least proves that a weapon can be possessed if it has some sort of relation to military utility (Johnson 215), but it does not conclusively define a "collective" right to bear arms (Denning 734). Denning points out a recent concurring opinion of Printz v. United States from Justice Thomas supporting the last point, saying that the Miller ruling "did not… attempt to define, or otherwise construe, the substantive right protected by the Second Amendment" (Denning 734). It is also pointed out that Miller did not file a brief on his or his codefendant Layton's behalf. They actually disappeared before the Supreme Court heard their case (Gunn 40). The state subsequently dropped their charges against the defendants, but it continued to appeal the case to the Supreme Court (Murley). The one-sidedness of the case begs the question of whether the outcome would have been different if the Court had to contend with both sides of the issue.

The collective rights side of the debate find ample evidence in their favor within the amendment's wording as well. Their focus is on the militia portion of the amendment, which they believe provides the rights of states to muster militias such as today's National Guard. Kevin T. Streit, writing for the *William and Mary Bill of Rights Journal*, sums up the states right view in saying that the Second Amendment gives the states the right to maintain their own "militias without the interference from the federal government, especially from the federal governments disarmament of the citizens of a state" (Streit 661). This point is backed up by lower court findings since Miller, which will be reviewed later.

In reviewing Second Amendment rights in the *Brigham Young University Law Review*, Stephen H. Gunn found it important to point out an article by Keith A. Ehrman and Dennis A. Henigan. They provide a more detailed explanation of why the Second Amendment stands in favor of the states rights view:

> First, the Second Amendment was passed as an assurance to the states that they would have the right to maintain their own militias… Second, the second amendment does not operate as a restraint to the states. It acts as a restraint on the federal government. Third, there is not substantive historical evidence for the claim that the second amendment guarantees an individual right to have arms for any purpose other than participation in a state-regulated militia. Fourth, as long as federal gun laws do not adversely affect the organized state militias, these laws should encounter no second amendment problems… (Gunn 39).

The collective rights advocates have a wealth of lower court rulings to bolster their arguments. Having only the Cruikshank, Presser, and Miller cases to use as Supreme Court guidance, the courts repeatedly rule Second Amendment-related cases in favor of a collective rights view. The first case to reach an appellate court on the subject after Miller was Cases v. United States. The Cases court narrowed the sorts of weapons that are protected by the Second Amendment to those that the possessor himself uses for militia purposes (Streit 665). This is significant not only because it rules out any "overly literal application" of the Miller case (which someone might use to justify possessing tanks or heavy artillery), but also because it set the precedent at least in First Circuit Courts that the only individuals defended under the Second Amendment are members of "military organization" who use their weapons for that purpose (Streit 665). Further cases heard by lower federal courts have used a three part test established by the Cases ruling, which considers whether the defendant is a member of a military service, what additional rights if any the state grants to its citizens, and whether the Second Amendment protects the type of weapon in question (Streit 665). The most important lower court gun control case since Cases has been Quilci v. Village of Morton Grove, 695 F.2d 261 (7th Cir.1982). This case involved a Morton Grove, Illinois ban on all privately owned handguns. Gun owners took the case to court in order to stop the law's enforcement, in which the federal district court gave the town government summary judgement (Murley). On appeal, the Seventh Circuit Court of Appeals cited Presser v. Illinois, in that the Second Amendment protected only against infringement by Congress (Ducat 607). The ruling went on to cite Miller, in that the right to keep and bear arms extended only to those necessary in maintaining a well regulated militia (Ducat 607). Certiorari was denied by the Supreme Court, making Quilci yet another concrete precedent in the realm of lower court jurisprudence on the subject.

In the past decade there have been a number of interesting Supreme Court cases which could affect a new test case by the Court if it were to squarely deal with a new Second Amendment case. An interesting point on these cases is that none of them directly deal with the amendment, and some do not even mention it. One such case advocated by Murley is DeShaney v. Winnobago County Social Services Department 489 U.S. 189 (1989). This case involved a boy who was rendered mentally retarded after a beating from his father. Despite full awareness of the abusive conditions the boy lived in, the Department of Social Services (DSS) failed to take the boy away from his abusive father. Months later he went into a coma after another severe beating (Murley). The boy's mother sued the DSS, claiming that as a representative of the state, it failed to protect his Fourteenth Amendment right by depriving him "his liberty interest in his bodily integrity" by failing to protect him from abuse that they knew about. The Supreme Court ruled in favor of the DSS, stating that Due Process Clause limits the state's power to act, but does not guarantee any certain level of safety to the public (Murley). In other words, though the state could not take away rights, it is not obliged to protect individuals against violations of life and liberty rights through other means, even in this particular case where the state knew about the violations (Murley). The ruling defined the state's obligation to protect its citizens lies in cases when the state holds one in custody, preventing him from taking care of himself (Murley). Murley makes a detailed argument that because the state is not necessarily obligated to protect the people, and because the Fourteenth Amendment specifically protects the people's right to life and liberty, then the responsibility to protect these rights lie within the people themselves (12). He argues further that laws that take away the people's rights to bears arms would make the Due Process Clause an "empty promise" (12).

Another interesting case involves a more recent ruling by the Supreme Court on the definition of "the people" in the Second Amendment. United States v. Verdugo-Urquidez 494 U.S. 259 (1990) involved a Mexican citizen who claimed that his Fourth Amendment rights were violated by evidence obtained against him in Mexico and used in United States courts. The Court ruled in favor of the government, in part because the searches and seizures of evidence occurred in Mexico and that the term "the people" in the Fourth Amendment did not apply to him as a Mexican citizen. Of interest to individual rights advocates is the Court's explanation of "the people." This term was given equal meaning throughout its use in the First, Second, Fourth, Ninth, and Tenth Amendments to mean the citizenry of United States. The Second Amendment is mentioned specifically as is each of the other cited amendments, with the majority opinion stating "The Second Amendment protects 'the right of the people to keep and bear Arms.'" Murley opines that though Verdugo-Urquidez may not be the case that ends the collective rights trend of the courts, the fact "the Court implicitly views the Second Amendment in the same manner as the First and Fourth Amendments is long in coming," and could have a big impact on how the Court rules on a future Second Amendment case (Murley). Streit dissents for the collective rights advocates, stating that the Court's reference to "the people" in Verdugo-Urquidez fails to determine whether it applies to all the people or those in military service and, therefore, is of little importance (Streit 664-665).

United States v. Lopez 000 U.S. U10287 (1995) challenged the federal government's authority to regulate firearms under the Gun Free School Zone Act of

1990. This law forbade the possession of guns within 100 meters of a school. Lopez was a high school senior who was found carrying a pistol and subsequently charged under the Act. The government justified the Act under the its power derived from the Commerce Clause of *The Constitution*. The federal government has in the past and does now regulate firearms through the Commerce Clause, preventing interstate travel of certain weapons. The Court ruled that the federal government overreached its authority under the Commerce Clause, since Lopez's possession of the pistol was not related to commerce. While this put limits on the federal government's ability to regulate firearms through the Commerce Clause, Streit points out that this ruling did not invalidate any other regulations the government had in place at the time (Streit 656).

Perhaps one of the most discussed cases that could have an affect on a new Second Amendment ruling is <u>Printz, Sheriff/Coroner, Ravalli County, Montana v. United States 000 U.S. 95-1478 (1997)</u>. The federal government passed the Brady Act in 1993, which required background checks to be performed on all persons purchasing certain firearms. This was to be accomplished through a computerized network, which had not yet been established. In the meantime, until the network went online, an interim provision of the Brady Act required state and local officials to perform these checks. Sheriff Printz took the issue to court, charging that the provision was unconstitutional because it required state and local governments to enforce a national law. The Court agreed, ruling that such an order violated the "structural framework of dual sovereignty". Whether the Brady Act itself can be challenged remains to be seen, but collective right advocates such as Streit content that Printz is merely a continuation of the Supreme Court's trend of giving back to the states powers which have been taken by the federal government (Streit 666-667).

As the debate over the true meaning of the Second amendment rages on, both sides of the argument continuously urge the Supreme Court to clarify the subject by hearing a new case as soon as possible (Streit 668). Most agree that the Supreme Court never defined the Second Amendment specifically (Harmer 100), certainly not as well or with the energy that is has the rest of the rights in the Constitution. While both sides have a stake at a new test case, most of the sentiment lies in just resolving what Murley calls "a ridiculous national debate" by settling the issue once and for all. Murley states that though the individual rights school may have a viable argument for incorporating the Second Amendment, it cannot do so because the Supreme Court refuses, or is so reluctant to hear such cases (Murley). Brannon Denning asserts that the Courts refuse to hear a case because of political/institutional reasons rather than "analytical" ones (Denning 752). Sanford Levinson, who many accredit with initiating the past decade of debate through his article "The Embarrassing Second Amendment," sums this consensus in stating that all sides would applaud a Supreme Court ruling, if for no other reason than to finally recognize the amendment's existence and take their responsibilities as the final word on Constitutional interpretation (Levinson 136).

WORKS CITED

Denning, Brannon P. 1998. "Gun Shy: The Second Amendment As An 'Underenforced Norm.'" *Harvard Journal of Law and Public Policy* 21:719-786.

Ducot, Craig R. 1996. *Constitutional Interpretation- Rights Of The Individual.* Vol. 2. New York: West Publishing Company.

Gunn, Steven H. 1998. "A Lawyer's Guide To The Second Amendment." *Brigham Young University Law Review* 1998:35-46.

Harmer, David. 1998. "Securing A Free State: Why The Second Amendment Matters." *Brigham Young University Law Review* 1998:55-101.

Johnson, David E. 1998. "Taking A Second Look At The Second Amendment And Modern Gun Control." *Kentucky Law Journal* 86:197-222.

Levinson, Sanford. 1998. "Is The Second Amendment Finally Becoming Recognized As Part Of The Constitution? Voices From The Courts." *Brigham Young University Law Review 1998:127-136.*

Murley, David E. 1998. "Private Enforcement Of The Social Contract: DeShaney And The Second Amendment Right To Own Firearms" *Duquesne Law Journal.*

Printz, Sheriff/Coroner, Ravalli County, Montana v. United States 000 U.S. 95-1478 (1997).

Streit, Kevin T. 1999. "Can Congress Regulate Firearms?: Printz v. United States And The Intersection Of The Commerce Clause, The Tenth Amendment, And The Second Amendment." *William and Mary Bill of Rights Journal* 7:645-670.

United States v. Lopez 000 U.S. U10287 (1995).

United States v. Verdugo-Urquidez 494 U.S. 259 (1990).

Five Lives or *American Pie*?

Courtney E. Walsh

Courtney E. Walsh, from Fort Lauderdale, Florida, is a member of the Class of 2001 and majors in political science with a focus in law and legal studies. Upon graduation, he will serve this country as an officer in the United States Marine Corps and attend law school. The following paper was written for an ethics class at Georgetown University in Washington, D.C., during the previous summer while staying with Brigadier General and Mrs. Hugh Tant. Courtney illustrates, through various scenarios, how even the smallest day-to-day decisions have real life ethical consequences.

While preparing to leave for a movie, I scramble around the house searching for spare funds. I quickly remember to look in the living room to see if I left my wallet there. Thankfully, I find the wallet and move to turn the television off. As I turn towards the machine, Sally Struthers appears before me surrounded by a tribe of hungry, diseased children. She announces that each viewer has the power to cure five of these children from the crippling disease polio with a donation of as little as twenty dollars. I peer down at my wallet and laugh nervously at the coincidence that I have exactly twenty dollars. Is it five lives or *American Pie*?

Contemporary philosopher, Peter Singer, addresses the issue of whether people have the moral responsibility to prevent suffering. Without hesitation, Singer says that each person has a moral responsibility to give to others in cases of suffering (Singer 231). Giving must transcend the boundaries of proximity and locality and reach all persons equally whether those suffering are five blocks away or five time zones away. Additionally, those who give must do so until they risk "sacrificing anything of comparable moral worth" (Singer 231). While this imperative certainly sounds strict, Singer does ease off of this position by saying we should give without risking anything of significant moral importance (Singer 231). By doing this, Singer realizes some of the lifestyle realities of living in a prosperous, developed country. For instance, a car is a necessity in most metropolitan areas in order to work. Holding steady employment directly affects a person's ability to feed, clothe, and house him or herself. Consequently, an automobile does have moral significance. The only issue is how expensive an automobile can be while still maintaining moral significance.

Now aware of Singer's argumentation, I am more prepared to answer the difficult moral question concerning five lives or *American Pie*. At this point, the question can hardly be taken seriously. Having the ability to save five persons by foregoing two hours of recreation is an important and worthwhile moral responsibility. While a movie does maximize pleasure in my life for a couple of hours, the far greater pleasure lies in the salvation of five lives. Relieving the crushing pain and anguish of polio literally changes the directions of those young lives; the laughs that *American Pie* will bring to me cannot remotely compare to the pleasure those children will feel.

By using Singer's example of the drowning baby versus the worth of a pair of pants, a hedonic calculation can be formed to prove the greater worth of five lives versus a movie (Singer 231). A hedonic calculation, the primary tool of the Utilitarian philosopher, is a logical listing of options and the amount of pleasure each option can produce versus the others. Simply put, the option that leads to the greatest happiness is the morally correct one. Singer describes a gentleman walking by a pond on an average Sunday morning. While passing, he notices a young baby face down in the pond obviously struggling for life. The passing gentleman forgets the fact that his pants may be ruined by the rescue and saves the baby's life. The pants lose moral significance at that point according to Singer. Applying this example to the ethical value of a movie clarifies why it loses moral significance when compared to the lives of five children. For instance, a decent pair of khaki slacks costs anywhere between thirty to fifty dollars. The gentleman who saves the child by sacrificing his thirty-dollar slacks makes the morally correct decision. This conclusion seems obvious and incontrovertible. Now apply the same calculation to the twenty-dollar movie budget versus the five polio-stricken lives in question. The gentleman who sacrifices his Friday evening movie is far more virtuous than the person who loses his slacks. One person saves five lives, while the other merely saves one. Additionally, sacrificing the movie is hardly a sacrifice at all considering the annoyance of ruining a nice pair of pants and getting wet and muddy. So, by use of strict hedonic calculation, donating twenty dollars to save five lives is a more significant moral act than diving into a pond to save one life.

While Singer's arguments are sensible to most observers, Williams, a critic of Singer's utilitarian consequentilaism, offers some logical insight to the contrary. Williams contends that people do not have a moral responsibility to clean-up for immoral acts that are created by others. Williams poses the hypothetical situation of an American travelling abroad to illustrate her criticism of utilitarianism. Jim travels innocently to South America on a botanical expedition (Williams 98-99). During the trip, Jim gets lost and finds his way into a town torn by civil war. The military captain, Pedro, plans to kill twenty of the native Indians just as Jim walks into town. After brief discussion, Jim is given the choice of killing one of the natives so the others may live or allowing Pedro to kill all twenty of them. From a teleological perspective, Jim has an obligation to kill one of these natives in order to maximize utility (Williams 94-95). While the utilitarians place this heavy responsibility on Jim's shoulders, how is this his fault? Jim does not want to kill anyone. Pedro, in fact, is the person completely responsible for the murders. All Pedro has to do is let every native free and not kill any of them. Similarly, why does each person bear responsibility for immoral actions taken by others?

The five third-world children stricken by polio are probably not subjects to a decent and moral political environment. Most third-world nations experience terrible disease, famine, and war from political forces acting greedily in their own lands, not from natural disasters or anything else for which the average American could remotely bear responsibility. By helping the poor, one perpetuates greedy leaders. Jim's situation can be magnified at the international level as well. Third-world dictators, such as Fidel Castro, tell the United States that, unless Americans help the citizens of his island, he will be forced to allow them to die. Castro then turns around and blames the United States for the poverty of his island when the situation is quite the opposite. Leaders like Castro place first-world democracies into tough moral positions routinely with semantics and demagoguery. Assume the five polio stricken children are Cuban. Responsibility for their situation lies at the hands of Castro's greed and he should be held accountable for the pain of those five children according to Williams. By taking positive action in the welfare of the Cuban people, America becomes responsible for the Cubans that do not receive help and for Americans that suffer due to reallocation of funds.

On such a grand political scale, Williams' logic makes a good argument against Singer's philosophy. However, when applied to the question at hand, whether I should give twenty dollars to save human lives, Singer still stands as a stronger case. A twenty-dollar sacrifice for something as trivial as a movie is a reasonable effort in fighting polio. By setting aside twenty dollars of recreational spending, I do not harm my life or the lives of any other person in the world. The personal sacrifice only maximizes good. If America diverts significant funds to nations such as Cuba, it only takes from others who qualify for help, not maximizing happiness overall. Additionally, it only perpetuates the suffering of Cuba because it eases the pressure and responsibility of Castro's government making his reign more secure. The seemingly moral act promotes future immoral acts. If I sacrifice twenty dollars from my own budget for those in dire situations, the same consequences do not apply.

A second line of reasoning Williams uses to refute utilitarian arguments similar to Singer's is based on the needs of utilitarian agents. In the pursuit to maximize higher-order pleasures (feeding the hungry, curing the sick), where do the basic, lower-order needs of the moral agents fall into Singer's system of priorities (Williams 111-112)? Williams sees a certain absurdity in a philosophy that maximizes happiness, but has the potential to lead to a positively miserable life. Williams says ,"Utilitarianism would do well to acknowledge the evident fact that among the things that make people happy is not only making other people happy, but being taken up or involved in any of a vast range of projects" (Williams 112). For instance, I may be attending this movie with the girl of my dreams who has the potential to become a long-term girlfriend and then possibly my wife. Losing opportunities such as meeting a future partner are morally significant and do have moral value. Examples such as this make flaws in Singer's argument evident.

Singer's answer to such an example would be his "significant moral worth" clause (Singer 231). Singer does allow for the moral agent to determine whether the movie is morally valid by measuring its moral significance in life. If I am going to the movie with a potential girlfriend, the movie does have moral significance in my life. Marriage is one of the institutions that makes life satisfying and happy. Unless I date, I am probably not going to find a wife. Singer would probably allow for the movie in such an instance. On the other hand, if I only want to see a movie because I am bored with what is on the television that evening, then the movie loses moral significance. Personal projects and needs do play a role in Singer's philosophy as long as they bear some moral significance in the long-term existence of the individual.

While Singer certainly would have us forego a movie in order to save five lives, Immanuel Kant may say otherwise. As a deontologist, Kant is philosophically opposed to Singer's utilitarianism, yet their opposing philosophies happen to point towards the same conclusion. In order to place Singer within the Kantian system of morality, it is important to look at the exact phrasing of Singer's conclusion. Singer says , "If it is in our power to prevent something bad from happening, without thereby sacrificing anything of comparable moral importance, we ought, morally, to do it" (Singer 231). This conclusion sounds very similar to a Kantian maxim. Because of its structure, it can then be universalized in order to study the morality of it. Kant's universal imperative of duty says ,"Act as if the maxim of your action were to become by your will a universal law of nature" (Kant 31). If the entire world gave reasonable amounts of extra income in order to save the lives of suffering people, the world would probably be a very nice place. On that level, Kant would probably give the twenty dollars to Sally Struthers and claim it as a moral act.

Another aspect of gaining Kant's endorsement to give the twenty dollars is the study of motive. The basis of deontology is adherence to duty. Acts are moral if they are done out of respect for duty and law, not because they make a person feel good. Referring back to Singer's conclusion, he uses the word *ought* in order to describe why anyone should give to the needy. *Ought* implies obligation, responsibility, and duty. Even though Singer is a utilitarian, his argumentation sounds deontological. In fact, Singer says ,"Since most people are self-interested to some degree, very few of us are likely to do everything we ought to do. It would, however, hardly be honest to take this as evidence that it is not the case that we ought to do it" (Singer 238). Kant makes nearly the same statement at the end of Section I. Kant says that human self-interests such as inclinations and happiness often counterweigh the necessity for duty (Kant, 17). Singer and Kant are using a similar pattern of thought when speaking of duty and obligation. Despite Singer's utilitarian background, the only happiness that counts is that of the five polio-stricken children. The happiness of the moral agent is not a priority because he should give the twenty dollars out of obligation. Kant would also agree with donating the twenty dollars because it is a situation that fits within the universalized maxim. Because the maxim can be used as a universal law, we then have a duty to uphold the law and give the twenty dollars.

WORKS CITED

Singer, Peter. *Philosophy and Public Affairs*. Princeton University Press, 1972.

Williams. *Utilitarianism.* By Smart et al. Cambridge University Press, 1973.

Kant, Immanuel. *Groundwork of the Metaphysics of Morals*. New York: Cambridge University Press, 1998.

Research on Patterns of Reciprocal Fractions in Egyptian Mathematics

Lee Hauter Miller

Lee Hauter Miller, from LeClaire, Iowa, is a member of the Class of 2001 and is majoring in Mathematics (B.S.). Upon graduation, he will serve this country as an officer in the United States Air Force, get married, and attend graduate school in Management Information Systems (MIS). The following paper was written for Dr. Jack Rhodes' Honors Directed Research Project course where an individual cadet conducts personal research under the direction of two faculty members, a primary and a secondary evaluator. The primary evaluator, Dr. Spencer Hurd, is from the mathematics and computer science department and the secondary evaluator, Dr. Jane Bishop, is from the history department. Lee will present his research to the Citadel Math Club later this year and also hopes to present this to the National Symposium on Undergraduate Research this fall. The paper begins with a thorough examination into the background and history of Egyptian Mathematics, and then goes into Lee's personal research of attempting to answer the unsolved question "How did the ancient Egyptians come up with their solutions for solving mathematical problems with fractions of the nature 2/n involving only combinations of unit fractions?"

One of the most fascinating and largely unexplained stories in the history of mathematics concerns the mathematical abilities of the ancient Egyptians. Examining culture through its level of mathematics is important to modern researchers and historians. It allows them to hypothesize and draw parallels between past civilizations throughout the world and use mathematics, a universal language, to interpret the level of technology and civilization present. This research paper will give comprehensive information about the background and different uses of Egyptian mathematics, and then journey, in detail, into personal research of Egyptian reciprocal fractions, focusing on fractions of the nature 2/n found in the RECTO of the Rhind Mathematical Papyrus. Every reciprocal fraction of the nature 2/n from the RECTO is listed at the end of this research project.

According to the famous mathematical historian Doctor Arnold Buffum Chace, "the single attribute of human intellect which would clearly indicate the degree of civilization of a race or people… would be the power of close reasoning, and that this power could best be determined in a general way by the standard mathematical skill which members of the race displayed.[1]" If one takes Dr. Chace's advice and uses mathematical capabilities as a measuring tool, we can deduce that the Egyptians were by far one of the most mathematically advanced civilizations the world had ever seen. Furthermore, one can deduce that no civilization had been able to improve Egyptian mathematical techniques for a period of over 1,000 years.[2] These techniques were finally

[1] Chace, Arnold Buffum, with Bull, L., Manning, H.P. & Archibald, R.C., The Rhind Mathematical Papyrus. vol. 1 (Oberlin, Ohio: The Mathematical Association of America, 1927) 4.
[2] Gillings, Richard J., Mathematics in the Time of the Pharohs (New York: Dover Books 1978) 16.

allowed them to create stunning buildings and mega-cities, 4,000 to 7,000 years ago. Amazing thought and effort went into this civilization that existed virtually unchanged for centuries longer than any other empire in history.[3]

Egypt, the *Empire of the Nile*, was unified around 3100 BC by Menes. His reign of power began many dynasties of Pharaohs who would lead Egypt for the next thirty centuries. The Egyptian Empire extended over one thousand miles through the longest river valley in the world, covering a longer and larger territory than any other previous empire. Herodotus, a famous Greek historian, described Egypt around the year 443 BC as "the gift of the river"[4] noting how Egypt's entire way of life was dependent on the annual spring flooding of the Nile. Modern researchers continue to marvel at the extensive design of irrigation canals that supplied their desert-dwelling inhabitants with life-sustaining river water and at the enormous, strategically located storage granaries that held their food supplies. The flooding of the Nile over its banks is the most important event in the Egyptian agricultural year because it gives the only new life to the parched desert land.

The flooding of the Nile also signaled the coming of the New Year in the Egyptian calendar. The flood-god Sooths, or Sirius, was worshiped by Egyptians as "herald of the New Year and of the flood." These exact words were written on an ivory tablet found in a First Dynasty Tomb in Abydos.[5] The New Year was originally heralded a few weeks beforehand by the first visibility of the star Sirius in the morning sky. This is referred to as a *heliacal* rising of Sirius, as Sirius and the sun rose together in the sky at the same time. In ancient Egypt, this occurred around the 20th of July.[6] This day marks the first day of the first month, Thoth, in the Egyptian calendar.[7]

The Egyptian calendar was divided into 12 months of 30 days each, with 5 supplementary days at the end of each year. These months were originally named after the time of year they occurred in. The first four months were named *flood months or months of inundation*, (pronounced Ahket, as mentioned in the beginning of the RMP) the second four were the *months of growth and seed*, (prot) and the final four months were the *hot months* or *months of harvest* (shomu).[8]

The names of the Egyptian calendar months are as follows:

The Flood Months	**Months of Seed**	**Months of Harvest**
1. Thoth	5. Tybi	9. Pachon
2. Phaophi	6. Mechir	10. Payni
3. Athyr	7. Phamenoth	11. Epiphi
4. Choiak	8. Phormuti	12. Mesori

These 12 months and the 5 supplemental days added to the calendar comprised the Egyptian *wandering year* of 365 days. The solar year, as you know, however, has 365 and one-fourth days, so that every four years the Egyptian year falls one day behind the solar year. In the course of centuries, therefore, the Egyptian year wanders through all the seasons of the year; hence the expression *wandering year*.[9] Therefore, about every

---

[3] Gillings. – 3-4.
[4] Burton, David M., The History of Mathematics (Boston: McGraw-Hill Books, 1991) 8.
[5] Van der Waerden, B. L., "The Birth of Astronomy," Science Awakening II, vol. 1, 1974, New York, 8-9.
[6] Van der Waerden, The Birth of Astronomy – 8.
[7] Van der Waerden, The Birth of Astronomy – 9.
[8] Chace – 45., and Van der Waerden, The Birth of Astronomy – 10.
[9] Van der Waerden, The Birth of Astronomy – 10.

1440 years, the start of the Egyptian calendar makes a complete cycle through all the seasons and comes back to the same point.

The outstanding design of intricately detailed buildings and monuments set an aesthetic standard for future cultures and civilizations that has been followed by future civilizations through modern times. Egyptian pyramids display breathtaking megalithic architecture. They are vast, stunning tombs that have withstood the desert sands and the test of time, some of which are dated at around 6,000 years old. Many scientists remain baffled that the largest Egyptian pyramids have not slowly sunk into the Sahara as predicted. This megalithic architecture required a considerable amount of technological skill. Large stones must be quarried, transported over a considerable distance (without the extensive use of a wheel until the 19th century BC),[10] and dressed to fit together.

Egypt's armies and seagoing vessels were well organized and efficient, making them the largest military power of their time. By the 16th century BC, Egyptians utilized the horse, the wheel, chariots, and warships. This century is generally considered the height of the Egyptian civilization, a civilization that would remain the strongest and most powerful in the world for the next 1000 years.

Egyptian culture is currently being widely heralded for its mathematical and technological achievements; however, this has not always been the case. Many researchers of Egyptian Mathematics claimed that they were primitive mathematically, mainly because of their failure to understand its unique simplicity and efficiency. "It is remarkable that the Egyptians, who attained so much skill in their arithmetic manipulations, were unable to devise a fresh notation and less cumbersome methods."[11] These historical researchers thought they had many noteworthy reasons to label the Egyptians as primitive. They did not fairly view the Egyptians in light of other ancient civilizations and by not doing so were contradicting historical fact. This is primarily because there is no indication of change or improvement in Egyptian mathematical methods from 2000 BC to the beginning of the Greek period in almost 600 BC. Therefore, for a period of about 1400 years, people extensively used mathematical techniques developed by the Egyptians. Egyptians have never indicated through their records that they used a plus, minus, multiplication, or division sign when calculating mathematical equations, but in the Rhind Mathematical Papyrus, it is indicated that hieroglyphs did exist for addition and subtraction, but not for equals.[12] They used an elaborate system of weights and measures, but lacked a coinage system. (In fact, there is no known use of a coinage system until it was invented by the Lydians around the year 620 B.C.)

Even more remarkably, they did not have symbols for common fractions, except reciprocals, that is 1/n for any n. Egyptians did not use the concept of a zero or an empty place-holder number. They wrote a mark or stroke, as we use a decimal point, to separate whole numbers from fractions.[13]

Although there is no proof that Egyptians understood the concepts of basic algebra, there is evidence to support the idea that they knew some basic geometry.

---

[10] Van der Waerden, B. L., Geometry and Algebra in Ancient Civilizations, (Berlin: Springer-Verdag, 1983) 22.

[11] Newman, James R., The World of Mathematics, vol. 1 (New York: Simon and Schuster, 1956) 172.
[12] Burton – 13.
[13] Gillings – 15.

According to David Burton, "It is safe to assume that in a country where cultivating the smallest amount of soil was a matter of concern, land measurement (and use of geometry) became increasingly important."[14] The word *Geometry* itself is a combination of the words "geo" for earth and "metry" for measure. In a sense, historians believe Geometry came about from the Egyptians' need to accurately measure land. Many believe that the roots of Geometry began along the banks of the Nile around 4000 BC and that these same techniques were used over a period of almost 5,000 years. In a passage dated at about 420 BC, the Greek philosopher Democritus, who believed that he alone was the greatest Geometer on Earth, testified that "the Egyptians still rank the highest among the (other) great Geometers."[15] From what is known about Egypt, the generally accepted theory is that Geometry probably came about in Egypt through necessity as the yearly flooding of the Nile would demand that people's land would need to be resurveyed annually for taxing purposes.

The Egyptians were known to be excellent surveyors of land, and their main tool was a rope with knots or marks at equal intervals."[16] In fact, in the Egyptian society there was an elite class of *rope-stretchers*, called 'harpedonaptai,' dedicated to a life of surveying and making precision measurements. Egyptian testimonies concerning these *rope-stretchers* were thoroughly discussed by Dr. Gandz in his paper "Die Harpendonapten oder Seilspanner."[17] An inscription describing the foundation of a temple at Abydos by Sethos I (1300 BC) indicates the prestige and importance of a rope-stretcher in Egyptian society. "The gods speak to the King saying: 'You were with me in your function as my rope-stretcher.'"[18] Still earlier, Pharaoh Thutmose III (1500 B.C.) is said to have *honored* rope-making when he spanned a perfectly measured rope toward the sun-god Amon at the horizon.[19] Gandz has discussed that the *rope-stretchers* were among the first experts in the world at *calculating* lines.[20] According to Democritus, Egyptian rope-stretchers were excellent surveyors, whose principle measuring instrument was the stretched cord.[21]

Although the Egyptians were excellent at calculating distances and measuring, one should not say that this made them excellent geometers, as claimed by the great Democritus. It should be noted that the extent of Egyptian geometry never extended past the determination of areas of land, and volumes of water (cubic content). These measurements only incidentally make use of formulas that are never explicitly stated and much less proved.[22] Ancient Egyptians practices do not fit the modern definition of what is 'geometrical' because they used no algebraic or mathematical proofs, and constructed only a few shorthand formulas (based on consistent measurement results) to aid in calculation with a small percentage of error. Among these *trial-and-error* measurement

---

[14] Burton – 50.
[15] Burton – 50.
[16] Burton – 50.
[17] Gandz, S., Die Harpedonapten oder Seilspanner, Quellen und Studien Gesch. Der Math, (Original German Text) vol. 1 (Berlin: Berlin Press, 1930) 255-277.
[18] Van der Waerden, Geometry and Algebra in Ancient Civilizations, 23-24.
[19] Van der Waerden, Geometry and Algebra in Ancient Civilizations, 23.
[20] Gandz – 235.
[21] Van der Waerden, B.L. "The History of Mathematics," Science Awakening I, vol 1, 1968 New York, 15.
[22] Harris, J.P., The Legacy of Egypt, (Oxfird, England: Oxford University Press, 1971) 35-36.

formulas are measurements for the area of a rectangle, a triangle, a trapezium, and a circle; the circle was the most interesting of these.[23]

Through precision measurement and calculations, scribes and *rope-stretchers* came up with the most precise formula the world had ever seen for the area of a circle. They represented a circle as A = (8/9d)^2 where "A" represented area and "d" was the diameter.[24] This led to an approximation for pi equal to 3.1605, a much better estimate than the standard 3, which had ordinarily been used by the Babylonians.[25] However, this calculation is not geometrically significant since we can be sure that it was not reached through the use of algebraic formulas. It is at best an indication of outstanding Egyptian measuring through precision trial and error.[26]

The principle problem with the Egyptian system of Mathematics involved their failure to understand basic algebra and lack of a systematic method for solving linear equations with one unknown. Complex hieroglyphic writing made equations difficult to follow, and because of this, the Egyptians could not figure out that their systems of problems included special common characteristics that could be solved using algebraic techniques.[27] This lack of a systematic system for solving simple problems also made it very difficult to express even more complex problems. More importantly, however, the Egyptian techniques of calculating were so varied and complex that it created a barrier to further mathematical progress.[28]

Part of the problem faced when researching the Egyptians is that Egypt, as a culture, was not studied in-depth until very recently. The first information out of Egypt did not come until Napoleon's ill-fated invasion of Cairo on Sept 25, 1798, with an army of 38,000 soldiers packed on 328 ships. Along with this group was a commission on the arts and sciences, including 2 mathematicians: Gaspard Monge and Jean-Baptiste Fourier.[29] These mathematicians were charged with making a comprehensive inquiry into the nature of ancient Egyptian mathematics. Upon return to France, the commission published their work in a set of monumental volumes called <u>Description de l'Egypte</u>. This work compared the Egyptians to other "monumental societies" like the Greeks and Romans.[30]

While digging in Cairo to construct fortifications to defend against the British fleet, Napoleon's soldiers accidentally unearthed one of the most important historical artifacts ever found, the Rosetta Stone. This stone was unearthed in 1779, by a French officer of engineers near the mouth of the Nile at the town of Rashid, which Europeans called Rosetta.[31] On this slab was written the same passage in Ancient Greek, Hieroglyphic, and Egyptian Hieratic script. The Rosetta Stone was the key artifact which allowed archeologists to translate the forgotten Ancient Egyptian languages. It was originally planned that this stone become a part of the wall around the port. No regard was given to the inscriptions upon the stone until Napoleon's scientists luckily stumbled

---

[23] Harris – 36.
[24] Harris – 36, and Van der Waerden, <u>Geometry and Algebra in Ancient Civilizations</u> – 170-171.
[25] Harris – 36.
[26] Harris – 37.
[27] Resnikoff, H.J. & Wells, R.O., <u>Mathematics in Civilization</u> (New York: Dover Books, 1973) 54-55.
[28] Resnikoff, & Wells – 56.
[29] Burton – 32.
[30] Burton – 32.
[31] Chace – 10.

upon them. These invaders realized its importance, and the Rosetta Stone soon became the most celebrated trophy of the war. It was finally delivered to the British Museum in 1801 in London after Napoleon's surrender. Although it took about 40 more years, the mysterious Hieroglyphic writing could now be deciphered.

Knowledge of Egypt, however, was not widely available to the general public until the unearthing of King Tut's tomb in the early part of the 20th century.[32] Prior to the 19th century, much more research had been done on the history of the Hindus, Persians, Phoenicians, Hebrews, Greeks, and Romans, all of whom came over two milleniums later than the Egyptians. "It is the circumstance that the mathematics, astronomy, and science of our earliest recorded civilizations, the Egyptian and Babylonian, have only recently been the subjects of historical research."[33] A major reason for the lack of understanding is failure to comprehend Egyptian hieroglyphics, which had been a lost language to modern man before the Rosetta Stone. Progress in deciphering early Egyptian writing began when Thomas Young recognized that Hieroglyphic writing was basically phonetic in 1814.[34] However, it was not until Jean Francois Champollion's Dictionnaire Egyptien appeared in Paris in 1882, that the Egyptian hieroglyphs were deciphered and finally available to the general public.[35] Champollion went on to formulate an Egyptian system of grammar and decipherment.[36]

The most important archeological contribution concerning Egyptian Mathematics was the Rhind Mathematical Papyrus (RMP). This 18 foot, 3 inch long reed scroll was written about 1650 BC by a scribe named Ah-mes who assures the reader that it is the likeness of an earlier script from the 12th dynasty, 1849-1801 BC in the time of a pharaoh named 'A-user-Re.'[37] It was discovered at Thebes in the ruins of a small building near the Ramesseum.[38] The scroll was written in Heretic, a shorthand form of hieroglyphics. In the scroll, there are 85 math equations that have been solved to help the reader understand. It is primarily from this scroll that modern mathematicians gain insights into the puzzling Egyptian mathematical system. Starting with the phrase "thorough knowledge of all things, insight into all that exists, knowledge of all obscure secrets,"[39] the casual reader wonders what exactly is mysteriously held in this *magical scroll*. It soon becomes apparent, however, that the scroll is a practical mathematical handbook, and that the only "secrets" are how to perform simple mathematical functions through the 85 problems listed in the scroll.[40] Most importantly, detailed descriptions of purely theoretical questions, using the difficult art of calculation with unit fractions, make this papyrus particularly noteworthy in the annals of mathematics history.[41] The papyrus was named after a Scotsman, Henry Rhind, who willed it to the British museum in London in 1878. Rhind also handed over another important historical mathematical document, the Egyptian Mathematical Leather Roll (EMLR). Due to its very brittle condition, however,

---

[32] Gillings – 2.
[33] Gillings – 1.
[34] Chace – 9.
[35] Chace – 10., and Gillings – 1.
[36] Chace – 10.
[37] Burton – 32., and Chace – 1.
[38] Chace – 1.
[39] Burton – 35.
[40] Burton – 35.
[41] Van der Waerden, The History of Mathematics – 16.

the EMLR was not examined for over sixty years until technology was invented that would keep it from further deterioration.[42] Another famous mathematical text discovered in Egypt in 1930 is the Moscow Papyrus. Written in the Middle Kingdom between 2050 and 2000 BC, it uses everyday examples from life situations to show mathematical equivalence relations.[43] Essentially, it gives us a very similar description of problems as the RMP, and the two documents together give us a comprehensive insight into the fundamental foundations of Egyptian Mathematics.

Mathematics was purely the product of the scribe, and, in Egypt, he exercised it for purely practical ends: the calculation of land, volumes of water, and distribution of food and rations.[44] The Rhind and Moscow papyri are clearly handbooks for these scribes, giving them model examples of how to perform tasks that were a part of everyday life.[45] This can be confirmed by a papyrus found in the form of a satirical letter, in which a scribe ridicules a colleague for his failure to do his job.[46] Among the failures listed by the scribe are ridiculous calculations for soldiers' rations and the number of bricks required for building a ramp of given dimensions.[47] Scribes were given the responsibility similar to modern bankers; determine the appropriate amount of goods distributed to the people based on set standards. For many hundreds of years, historians had claimed that the basis in all of mathematics was Egyptian in origin. Aristotle rationalized this in his Metaphysics A when he stated: "Thus the mathematical sciences originated in Egypt because there the priestly class was allowed leisure."[48] This idea on the origins of math has only recently been disproved upon the discovery of Babylonian mathematical tablets in the 17th Century.[49] Also, today we are convinced that Aristotle's priestly class should not be credited with originating math. We are convinced that Egyptian priests spent very little time with mathematics, as math was used for only practical worldly uses and had nothing to do with human destiny. Instead, we should give the credit to Herodotus and Democritus, who properly give credit to the scribes and rope stretchers as the backbone of Egyptian Mathematics.[50]

Egyptian papyri were similar to tablets written in Babylon, in that they give specific example problems with solutions. Babylonian texts, however, are similar to the Greeks and can be considered *pure mathematics*, due to the nature of the algebraic procedures involved.[51] There is no trace, whatsoever, of these intricate algebraic techniques found in Egyptian math.[52] Egyptians simply depended on the intelligent calculations of scribes and the careful measurements of their famous *rope-stretchers* using hieroglyphics to represent the mathematical *truth*. They used mathematics as a means to survive, not to explore.

---

[42] Burton – 33.
[43] Van der Waerden, Geometry and Algebra in Ancient Civilizations – 44.
[44] Harris – 27.
[45] Van der Waerden, The History of Mathematics – 17.
[46] Erman A., The Literature of the Ancient Egyptians, (London: London Press, 1927) 223.
[47] Erman – 223.
[48] Van der Waerden, The History of Mathematics – 15.
[49] Van der Waerden, The History of Mathematics – 15.
[50] Van der Waerden, The History of Mathematics – 16.
[51] Harris – 38.
[52] Harris – 38.

Some of the problems from Egyptian Mathematics have legacies that have lived on well into the future. In problem #79 of the RMP, the scribe asks what the answer is to $7+7^2+7^3+7^4+7^5$. Each term of the problem is associated with a thing, the first with houses, the second with cats, the third with kittens, the fourth with mice and so on. According to J. P. Harris, this famous problem, described by the RMP, has lived through the ages and is resurrected in the 13th Century with Leonardo of Pisa's work on calculation and the famous rhyme that begins, "As I was going to St. Ives, I met a man with seven wives…"[53] In Leonardo's rhyme, each wife had seven cats, each cat had kittens, each kitten caught mice, etc… As you can see, this is almost a word for word duplication of the problem described in the RMP nearly 3,000 years before! The only possible answer to this is that this problem with cats, kittens, and mice had become a standard for mathematicians teaching the concepts of exponential numbers to numerous civilizations throughout the Western World for nearly 3,000 years!

The invention of hieroglyphics, the first form of Egyptian writing, must have been the result of many hundreds of years of literary evolution. Hieroglyphics used everyday symbols to represent significant events, items, and supernatural beliefs in Egyptian life. Many hieroglyphic symbols were animals or birds, and the reading rule was always to read from head to toe. In mathematics, feet walking in the direction of reading are "going in" and indicate addition, while feet walking opposite the direction of reading are "going out" and indicate subtraction.[54] Hieratic, the first short form of hieroglyphics, was developed many centuries later as a quicker and more convenient way of recording an agreement, conveying a message, or making a calculation with numbers rather than by tedious drawing of detailed hieroglyphics. (To keep things easier to understand and less cumbersome, this research project and report will consist solely of hieroglyphic characters. Compressed hieratic characters make the math used in Egyptian calculations harder to understand for the reader.) In mathematics, hieroglyphics were used to represent numbers in a base ten system, very similar to the base ten system we use today. At the end of the report, there is a table of all the character examples of Egyptian numeral hieroglyphics used and what they represent.

From these hieroglyphics come the combinations for all numbers used in ancient Egypt. By using a base ten system, direct multiplication by ten was very easy. A scribe would simply change strokes to horseshoes, horseshoes to swirls, swirls to lotuses and so on. This system was used in conducting everyday business.[55] Perhaps this is the reason why mathematical texts, such as the RMP, were written in the form of everyday problems faced in life.

These heiroglyphic symbols, however, made it very difficult for Egyptian mathematics to contribute anything of important mathematical value to future civilizations. According to J. P. Harris, "The sheer difficulties of calculation with such a crude number system and primitive methods in developing logic effectively prevented developing the science for its own sake."[56] The only part of Egyptian math that has had influence on other civilizations is the unit fraction, which was very common in the

---

[53] Harris – 44.
[54] Resnikoff & Wells, Mathematics in Civilization – 51.
[55] Gillings – 13.
[56] Harris – 45.

Greco-Roman World and on into the Middle Ages.[57] Math served the everyday needs of the Egyptians and that was enough. Its interest for this research paper lies only in discovering the methods the Egyptians used to find their representations for their unit fractions.

In general, the Egyptians could conceive of only two kinds of numbers. These kinds consisted of an ascending series of integers from 1 to 1,000,000 and a descending series of fractions consisting of 2/3rds, ½, and every other smaller unit fraction on toward 1/1,000,000.[58] There were special words for the fractions ½, 1/3, ¼, and 2/3 in the Egyptian language, as they were used as commonly as any whole number.[59] There were no rational numbers, irrational numbers, or complex numbers in ancient Egyptian math.

It is now necessary to examine how the Egyptians used and calculated the four fundamental mathematical operations. Addition and subtraction, the most necessary functions for day-to-day living, have never given mankind much trouble. The ancient Egyptians must have evaluated quantities by sight and probably then by working with them in small, easily comprehensible sizes. There were a few major differences, however, between the Egyptian writing and our modern methods. First, it should be noted that the Egyptians wrote their language from *right to left*, or opposite to the way we write. Also, Egyptian numbers were added, out of necessity, in ascending order from *left to right*, with the smallest characters written on the left. Although no proof has ever been found, Gillings strongly believes that Egyptian scribes must have used some form of shorthand addition and subtraction tables to compute their answers. "It would seem that addition and subtraction methods were checked elsewhere by scribes, and the answers written on the papyri."[60] Scribal errors were so rare an occurrence in written documents found by archeologists that this seems to be the most feasible explanation to Gillings. The Egyptian Mathematical Leather Roll (EMLR) in the British Museum in London, Gillings infers, is very good evidence for the existence of addition and subtraction tables. The EMLR, according to Gillings, "forces us to the conclusion that reference tables were used for the four fundamental operations (indicated by +, -, *, and /) and that many tables were memorized by scribes just as our elementary students memorize them today."[61] However, no such tables have ever been found, and addition and subtraction are such simple operations that it does not seem necessary to other researchers. For instance, Dr. Burton believes the exact opposite of Gillings.

The Egyptians used a doubling and halving system for solving multiplication and division problems. This scheme of doubling and halving is often called "Russian Multiplication" because of its use through modern times among Russian peasants.[62] This ingenious method proved to be the backbone to the Egyptians' entire system of mathematics. It requires only the complete knowledge of doubling and halving whole numbers and reciprocals of those whole numbers. Doubling whole numbers is trivial, for both modern man and the ancient Egyptians. Doubling reciprocals required simple tables. When an Egyptian scribe needed to multiply two numbers, he first decided which

---

[57] Harris – 45.
[58] Chace – 4.
[59] Van der Waerden, The History of Mathematics – 19.
[60] Gillings – 11.
[61] Gillings – 14. (Egyptian Mathematical Leather Roll, British National Museum, London)
[62] Burton – 35-36.

would be the multiplier, and repeatedly doubled this until he got a sum equal to the other factor.

Here is an example: Suppose an Egyptian scribe wanted to multiply 25 times 9. He would create a table with two columns of numbers that are doubled in every row. The scribe would assume one of the numbers, say 25, was the multiplier, and places this number first on the second column. The first number of the first column of these tables was always one. Then the numbers in both columns were doubled until the intermediate multipliers were summed to the original co-factor. One stops doubling and places check marks alongside the entries on the left to indicate which numbers will be used when totaling the final answer.

Example: Multiply 25 by 9

Column 1	Column 2		
1 ✓	25		
2	50		
4	100		
8 ✓	200		
9	225	-	Totals

The scribe would stop doubling at 8 in the left-hand column because the next possibility, 16, is larger than 9, the other factor, and would never be used in a final calculation anyway. Check marks should be placed alongside the 1 and 8 rows in the left column because 8+1=9. The corresponding numbers in the right hand column, when totaled, give us the product, 225. This simple ingenious method works for multiplying any possible pair of whole numbers. This works mathematically because every positive integer can be expressed as the sum of individual powers of two, or some sum from the sequence 1, 2, 4, 8, 16, 32, …[63] Notice that 9, when written in Binary Notation, is 1001. Written in powers of 2, $9 = 2(0) + 0*(2)^1 + 0(2)^2 + 1(2)^3$. The ones correspond to strokes in the left column, and the zeros correspond to blanks. Therefore, the Ancient Egyptians were the first recorded civilization to work with binary numbers!

The Egyptian division process was closely allied with their process of multiplication. A scribe would not ask what number would result from the division of a smaller number B into a larger one, A, but instead would ask the question "By what must I multiply B to get A?"[64] Algorithmically, this is like doing multiplication. The scribe would make doubling tables up until the numbers in the right-hand column became larger than the denominator. He would then put check marks beside the numbers in the right-hand column that added up to become A.[65] He then would add up the check-marked multipliers, in a similar way to multiplication, that correspond to the checked numbers, which resulted in his quotient.

[63] Burton – 35.
[64] Gillings – 19.
[65] Gillings – 20.

Example: Divide 7 into 84.

Ask the question "By what must I multiply 7 to get 84?"

Column 1	Column 2	
1	7	
2	14	
4	28	✓
8	56	✓
12	84	- Totals

The scribe would now stop doubling because the next possibility will produce a number in the second column, 112, that is much larger than 84. By using some easy arithmetic (probably on a wax tablet because papyrus was expensive), the scribe will find that 28+56=84. Therefore, he will place checkmarks next to the 28 and 56, and then add the corresponding numbers in the first column, 4 and 8. This gives him the answer 12. We note that 7(12) =84 is the same calculation. This process was used for all Egyptian integral division problems.

Some division problems, however, were not as simple as the problem above for the Egyptians. When an Egyptian scribe needed to divide numbers that do not divide evenly, reciprocal fractions had to be introduced. To divide some numbers, like 49 by 16, the scribe would begin by doubling the divisor until the next multiplication would exceed the dividend, as always. Then, however, he would start halving the divisor in order to complete his remainder. While solving problems with fractions, the scribe frequently doubled 1/10 to get 1/5 and halved 2/3 to get 1/3 of a multiplier.[66] The following example is a good illustration of how the Egyptians incorporated doubling and halving into their division problems.

Example: Divide 16 into 49.

Ask the question "By what must I multiply 16 to get 49?"

Column 1	Column 2		
1	16	✓	
2	32	✓	Stop doubling 16+32=48.
½	8		Begin halving.
¼	4		
1/8	2		
1/16	1	✓	
3 + 1/16	49	- Totals	

The answer to our problem is that 16 divided into 49 is 3 +1/16. It is important to remember that the Egyptians always used reciprocals to represent their fractions. Therefore, the reciprocals 1/2, 1/3, 1/4, … were the only acceptable written forms for any fractional representations. All common fractions could be and were written as the sum of these reciprocal fractions. The Egyptians, however, were not always able to get their answers to division problems right away. Usually, more difficult problems required a period of trial and error. This procedure usually consisted of three steps for the scribe:[67]

[66] Chace – 4.
[67] Chace – 5.

1. Multiply selected products until obtaining a product that is less than the desired product but nearly equal to it.
2. Determine the remainder that must be added to this number to complete the sum.
3. Determine the multiplier, or multipliers, that are necessary to produce this remainder.

This project will now go in-depth into reciprocal fractions in the next section. The use of 2/3rds as a fundamental backbone to calculating fractions and when dividing more complex problems of the RMP will also be discussed.

The Rhind Mathematical Papyrus

In general, the nature of every problem found in the Rhind Mathematical Papyrus is very practical. The papyrus acts as a guide to scribes determining proper measurements and equal exchange rates. This is vital to a civilization that relies entirely on a barter system of exchange of goods with no coinage system.

One typical type of problem found in the RMP involves determining exchange rates between goods. Egypt used many different exchange rates to determine an average *barter price* for the exchange of goods and the assignment of rations. The basic exchange between bread and beer was by guided from using the *pesu*. *Pesu* is a technical term used in the making of bread and beer from corn, and this term is conventionally translated as *strength*. One loaf of bread is said to be of strength 10 when 10 loaves of a standard size can be made out of one Hekat (See Bottom) of corn. Similarly, beer is of strength 10 when 10 standard measures of that type of beer can be made out of one Hekat of corn. Thus the term creates a good standard for the exchange of loaves of bread and beer. There are many examples of these famous *Pesu* problems in the RMP.

Example: Rhind Papyrus problem #76 poses a good example of a typical problem using exchange rates:[68] 'What is one-thousand loaves of strength 10 exchanged for an equal number of loaves of strength 20 and 30?'

The answer proves to be of very simple proportions. Here it turns out that the equal # at strength 20 and 30 is 200 loaves. This can be easy to see for us by solving the algebra problem $10 * 1000 = 20x + 30x$. The Egyptians solved this using simple proportions like in the following manner:

First, determine how many loaves you would get at strength 50. *Since 50= 20+30.*

Ask the Question "By what must I multiply 50 to get 1,000?"

Column 1	Column 2	
1	50	
2	100	
4	200 ✓	
8	400	
16	800 ✓	
20	1,000	Totals

Now they ask "What is the total quantity of 20 loaves at 10 pesus?"

[68] Harris – 34.

Since the answer is simple mathematics, 20 * 10 = 200, the scribe would have his answer for an equal number of loaves at strength 20 and 30.

In the RMP, we also find sequences of similar problems, in which an unknown quantity, 'h' (perhaps pronounced as "aha"),[69] has to be determined from a linear equation. A typical problem found among the 85 problems in the RMP would be written like RMP #26:

<u>Find a quantity whose 4th part, when added to it, becomes 15</u>.

In modern notation, the equation to be solved is $(1 + \frac{1}{4})x = 15$.

To find the solution, start by letting your quantity be equal to 4. One quarter of 4 is 1. So the total of 4 plus its quarter is 5. Now divide 5 into 15. Since 15/5 is 3, we now only need to multiply this number by 4 to obtain the desired quantity, 12.[70]

Dr. Van der Waerden, one editor of the RMP, explained that this type of calculation was an application of a method of "false assumption."[71] One starts with an arbitrarily chosen quantity, in our case 4. Four and one-fourth part of four give us 5. The required result here is 15; hence, the quantity has to be multiplied by the answer of 15/5 = 3. Another answer of this is given in the 4th edition of J. Tropfke: <u>Geschichte der Elementarmathematik</u> (Berlin, 1980) p. 385. In this, Tropfke explains that one divides the unknown quantity into 4 equal parts. Five of these parts are equal to 15, so every part is 3, and the original quantity was 4 times 3 = 12.[72] We can adduce from this that Egyptian scribes calculated 4 times 3 and not 3 times 4.[73]

Common Fractions

It is easy to understand that the Egyptians were very skilled when dealing with the basic integers and daily computations. However, the question remains, "How did the Egyptians deal with non-integral numbers?" Obviously, when dividing, one often leaves behind remainders. As you now know, it turns out that no numbers for any common fractions existed in the Egyptian number system, other than reciprocals. Reciprocals of integers, the fractions we denote by 1/n, were denoted by placing a hieroglyph "o" representing an open mouth over any integer to indicate its reciprocal. These reciprocals were the only fractions Egyptians were able to write in their language. The Egyptian, therefore, could not write such simple fractions such as 4/7 or 5/11 as single term expressions.

Another interesting feature is the fact that none of these combinations of reciprocals could use the same hieroglyph more than once.[74] Therefore, the combination 1/5 + 1/5 + 1/5 for 3/5 is not allowed in Egyptian mathematics. They would have thought it absurd to allow contradictions. In their eyes, there was one and only one "fifth-part" of a "whole."[75] There was only one "sixth-part," one "seventh-part," and so on.

[69] Van der Waerden, <u>Geometry and Algebra in Ancient Civilizations</u> – 160.
[70] Van der Waerden, <u>Geometry and Algebra in Ancient Civilizations</u> – 160.
[71] Van der Waerden, <u>Geometry and Algebra in Ancient Civilizations</u> – 161.
[72] Tropfke, <u>Geschichte der Elementarmathematik</u> (Berlin, 1980) 170-172.
[73] Van der Waerden, <u>Geometry and Algebra in Ancient Civilizations</u> – 161.
[74] Epstein, H. "Algorithms for Egyptian Fractions" <u>Mathematica Education and Research</u>, vol. 4, no. 2, (New York 1995) 5-15.
[75] Burton – 37.

The method of writing fractions (using only 1/n) corresponded to the words already in the Egyptian language. The "third part" or the "sixth part" corresponded to 1/3 and 1/6, respectively. There were no general terms in use for a general b/c fraction. This seems to be the only offered explanation for their unusual system to represent fractions, other than that it works.

Assume a scribe needed to find the reciprocal fraction equivalent of another common fraction like 3/5. Figuring the reciprocal representation of this was a relatively routine task, an Egyptian would have probably found the unit fraction equivalent of 3/5 by the following common division of 3 into 5.

Example: Divide 3 into 5.

Column 1	Column 2		
1	5		
1/2	2 + 1/2	✓	
1/4	1 + 1/4		
1/5	1		
1/10	1/2	✓	
1/2 + 1/10	3	-	Totals

Therefore, the Egyptians would have used the expression 1/2 + 1/10 to represent the fraction 3/5. This method would have been used to determine the representation for any 3/n fraction they would have come across. By using the methods found in solving 2/n fractions, the Egyptians would have found the representation for any 3/n fraction. In fact, this problem would have been treated as a division problem of 3 into 5 instead of a fraction.

To use such complicated decompositions into unit fractions, many reference tables must have existed; the simplest of which were committed to memory.[76] The Egyptians constructed tables of fractions on a large scale. There are not only multiplication tables, but also tables of reciprocals, so that finding the reciprocal and multiplying effects division.[77] Also, in multiplying or dividing, an Egyptian clerk, scribe, or priest would constantly need a reference table for 2/n (n is odd) equivalents since 2/n would occur every single time 1/n is doubled. At the beginning of the Rhind Papyrus, there is exactly such a table giving us Egyptian expressions for 2/3, 2/5, 2/7, 2/9, …2/101.[78] This table, referred to as the RECTO, fully occupies one-third of the 18 foot mathematical scroll, and it is the most extensive mathematical table that has ever come down to us from ancient Egypt.[79] This not only gives the equivalent form for any 2/n fraction, but also checks each one with a two-column table.

Calculating the 2/n fractions, represented by the reciprocal sum 1/x + 1/y, were the key calculations for the ancient Egyptians. The entire RECTO is based on the principle "to calculate 2 * 1/n, divide 2 by n."[80] Since the Egyptian multiplication and division systems were bound by doubling, and because twice 1/n is 2/n, the need for a reciprocal representation for 2/n occurred all the time. In solving problems for division,

---

[76] Burton – 37., and Gillings – 19.
[77] Harris – 44.
[78] Burton – 37.
[79] Burton – 37.
[80] Van der Waerden, The History of Mathematics – 23.

I have had to introduce operations for fractions, and, thus, according to Dr. J. P. Harris, I have come to the central problem of Egyptian mathematics.[81] The two basic requirements:

1. The exclusive use of unit fractions and
2. The additive system of multiplication

lead necessarily to a third: to express twice any unit fraction (2/n) as the sum of other unit fractions. This is the primary reason for the existence of the RECTO of the Rhind Mathematical Papyrus and its importance to the Egyptian scribe.[82]

The nature of 2/n fractional mathematical problems are the primary focus of the research part of this project. There are many patterns we can recognize in the use of reciprocals for 2/n fractions, and sums of these numbers are found later with the research project. In the first part of this research project, doubles of all reciprocal fractions from 1/3 through 1/101 will be investigated. When added together, these reciprocal fractions can make the equivalents of every other common fraction.

The problem of breaking up 2 times 1/n into a sum of unit fractions has an infinite number of solutions. As n increases, denominators get larger and larger and the fraction values smaller and smaller for any value of n. Even if one restricts n by specifying that the number of resulting fractions be as small as possible, there is often more than one solution. For instance 2/15 can be resolved into 1/10 + 1/30, 1/9 + 1/45, or 1/12 + 1/20. However, in general, only those fractional representations found in the RMP are found elsewhere in Egyptian mathematical texts.[83]. For example, the Egyptians exclusively used 1/10 + 1/30 for 2/15. The other two representations above were not used at all. Consequently, one major purpose of this report will be devoted to finding out on what basis these particular representations, found in the RECTO, were reached.

2/3 Fractions

A most ingenious backbone to the Egyptian system of Mathematics was their incorporation of the fraction 2/3rds into many calculations. It is clear today that the 2/3rds fraction was the natural fraction, familiar from everyday life, like one-half or one-quarter is today.[84] Two-thirds was the only exception to the unit-numerator and is denoted by a special sign in hieroglyphics: ✎. The evidence from this hieroglyphic symbol suggests that there is no doubt the Egyptians knew 2/3rds is the reciprocal of 1 1/2.[85] One example of incorporating the 2/3rds factor into calculations is by using it in complicated division problems.

---

[81] Harris – 30.
[82] Harris – 30.
[83] Harris – 30.
[84] Harris – 28.
[85] Gillings – 22.

Example: Divide 40 by 3

Column 1	Column 2	
1	3 ✓	
2	6	
4	12 ✓	
8	24 ✓	Check that 3 + 12 + 24=39 Now
2/3	2	find 2/3 of 3.
1/3	1 ✓	
13 + 1/3	40	- Totals

As one can see, by incorporating 2/3rds into complex division problems, the Egyptians could fairly easily find their fractional remainders. The Egyptians became so good at using this 2/3rds system, in fact, that they could take 2/3rds of any number in a matter of seconds. One example of this is found above. In order to take 1/3 of a number, the Egyptians actually calculated two-thirds of it first, then halved the result. Strange as it seems to us, this procedure is a standard practice in Egyptian mathematical texts. The two series, ½, ¼, 1/8, ... and 2/3, 1/3, 1/6 ...play a major role in Egyptian mathematical techniques.[86] The use of 2/3rds fractions proved to be the most important backbone of the entire Egyptian mathematical system.[87]

There were also many instances, particularly in the Rhind Mathematical Papyrus, where this 2/3 relationship was shown for fractional representations. Since 2/3rds was represented with 1/2+1/6, the Egyptians clearly understood how to find 2/3rds of any 1/k by using the expression 1/2k +1/6k, a sum which reduces to 2/3k.

The algebraic equivalent to this is: $\frac{2}{3}\left(\frac{1}{k}\right) = \left(\frac{1}{2}+\frac{1}{6}\right)\frac{1}{k} = \frac{1}{2k}+\frac{1}{6k}$. (1)

* This will now be referred to throughout my work as pattern (1).

In the RECTO of the RMP, *all* 2/n fractions, whose denominators n are divisible by 3 follow this general rule. Here are some of the first examples:

2/3=1/2 + 1/6	(k=1)	2/27=1/18 + 1/54	(k=9)
2/9=1/6 + 1/18	(k=3)	2/33=1/22 + 1/66	(k=11)
2/15= 1/10 + 1/30	(k=5)	2/39=1/26 + 1/78	(k=13)
2/21= 1/14 + 1/42	(k=7)	2/45=1/30 + 1/90	(k=15)

In summary, the Egyptians expressed fractions and combined the knowledge of doubling and halving integral numbers with the use of the fraction 2/3 as the two efficient and effective backbones to all their mathematical calculations.[88]

All Egyptian scribes used a few rules that simplified their use of unit fractions, according to B. L. Van der Waerden. There are five rules that must have been taught to scribes in school and that every scribe must have known by heart.[89] This must be true because the RMP seems to take these rules as completely obvious without ever mentioning them.

---

[86] Harris – 30.
[87] Gillings – 34.
[88] Gillings – 34.
[89] Van der Waerden, The History of Mathematics – 21.

(1) $1/3 + 1/6 = ½$ leading to
(2) $½ + 1/3 + 1/6 = 1$
(3) If 1/6 is added to both sides of equation (1), a fundamental formula of Egyptian mathematics is found: $\underline{2/3 = ½ + 1/6}$.
(4) Again adding 1/6 to each side, we obtain two equivalent equations for 5/6: $½ + 1/3 = 2/3 + 1/6$
(5) Finally if 1/6 is added to each side of (2), we obtain $\underline{2/3 + ½ = 1 + 1/6}$.

These equations comprise the mathematical knowledge necessary for the Egyptians to use 2/3rds fractions as extensively as they did.

In a doubling system of multiplication, one might need to double, say, 4+1/5. A scribe would get the answer 8+2/5. The Egyptians, however, did not have a way to write 2/5 directly. Instead, as previously stated, they would represent the full answer as 8+1/3+1/15, where 1/3+1/15 is a sum of two reciprocals for 2/5. Thus, it was vitally important for the scribe to have a table of such fractional equivalents, especially for 2/n in order to use this system of representation effectively. This notation of expressing fractions is cumbersome and difficult to work with, so the Egyptians made huge tables of expressions to organize this information.

In the following research, I will construct some tables to compare the many 2/n fractional representations for 1/x and 1/y and find any common patterns that the Egyptians may have used. In particular, I will show that every 2/n fraction always can be represented as 1/x + 1/y for some x and y. The Egyptians, however, more often used three or four terms for 2/n in their representations. Therefore, I will attempt to explain why this is so.

For example, in the RECTO of the RMP, there are many examples of 2/n numbers that used three or four terms in their representations.

<u>Three-term examples for 2/n</u>:
$2/13 = 1/8 + 1/52 + 1/104$
$2/17 = 1/12 + 1/51 + 1/68$
$2/19 = 1/12 + 1/76 + 1/114$

<u>Four-term examples for 2/n</u>:
$2/29 = 1/24 + 1/58 + 1/174 + 1/232$
$2/43 = 1/42 + 1/86 + 1/129 + 1/301$
$2/61 = 1/40 + 1/244 + 1/488 + 1/610$

Any 2/n fraction can be written in three and four-term representations for reciprocal fractions and many patterns can be found when using these numbers in patterns. For the purposes of this research project, I will start by considering only two-term representations for 2/n fractions. Two-term representations were the most commonly used by the Egyptians to represent 2/n fractions and the easiest fractions to find patterns for. The Egyptians never indicated knowledge of patterns in their arithmetic except for taking two-thirds of a fraction.

Example: In the RECTO, the first two mathematical representations for 2/n fractions not part of the pattern (1) = $\frac{2}{3}\left(\frac{1}{k}\right) = \left(\frac{1}{2}+\frac{1}{6}\right)\frac{1}{k} = \frac{1}{2k}+\frac{1}{6k}$ are:

2/5 = 1/3+1/15 and 2/7 = 1/4 +1/28.

In the RMP 2/5 is represented by 1/3 + 1/15. In view of the 2/3rds rule given above, one might suppose that intelligent Egyptian scribes would notice that a "two-fifths" rule could be formulated from $\frac{2}{5k} = \frac{1}{k}\left(\frac{2}{5}\right) = \frac{1}{k}\left(\frac{1}{3}+\frac{1}{15}\right) = \frac{1}{3k}+\frac{1}{15k}$.

Example: With k=7, 2/35 could be represented by $\frac{1}{3(7)}+\frac{1}{15(7)} = \frac{1}{21}+\frac{1}{105}$. The Egyptians, however, did not use other patterns like this or even create "algebra like" methods because they simply did not understand basic algebra.

This next look into reciprocal representations of common fractions will therefore examine the most simple of these patterns, the representation of 2/n as a two-term sum of reciprocals. I hope to find what the Egyptians missed. All 2/n fractions are the sum of at least one pair of reciprocals. That is, for any odd n, there always exists integers x,y such that 2/n = 1/x+1/y. Below are ten examples of these expressions where x is *as small as possible* (so 1/x is as large as possible).

<u>2/n = 1/x + 1/y</u>

2/3 = 1/2 + 1/6	2/5 = 1/3 + 1/15
2/7 = 1/4 + 1/28	2/9 = 1/5 + 1/45
2/11= 1/6 + 1/66	2/13 = 1/7 + 1/91
2/15 = 1/8 + 1/120	2/17 = 1/9 + 1/153
2/19 = 1/10 + 1/190	2/21 = 1/11 + 1/231

- To see a larger table of all the actual 2/n representations shown in the RECTO of the Rhind Mathematical Papyrus, see the table shown in the back.

While searching for patterns for x, and y, one discovers the equations <u>2x-1=n</u> and <u>nx=y</u>. Solving these equations algebraically for x and y, one finds that $x = \frac{(n+1)}{2}$ and $y = n\frac{(n+1)}{2}$. Explicitly, this series can be represented as

$$\frac{2}{n} = \frac{1}{\frac{(n+1)}{2}} + \frac{1}{n\frac{(n+1)}{2}}. \qquad (2)$$

Notice from the identity (2) that all fractions of the form 2/n have at least one two-term representation. *When n is a prime number, however, this will be the only possible two-term representation for 2/n.*

While working with other examples, I have noticed that frequently there were multiple (x,y) pairs for $\frac{2}{n} = \frac{1}{x}+\frac{1}{y}$. Therefore, presumably, there must be more identities other than (1) and (2) for certain integers. For example, when examining 2/9=1/x + 1/y, I found that there were two representations for 2/9.

First $2/9=1/5+1/45$

Also, $2/9=1/6+1/18$

The second equation does not fit an obvious pattern. It is a challenge to try to find a second pattern for the pair $(x, y) = (6, 18)$. To this end, it becomes necessary to find other $2/n$ fractions where there are exactly two possible representations. There is a pattern emerging right from the start. When n is the square of an odd prime integer p, $2/n$ fractions have *exactly* 2 possibilities for x and y.

While examining $2/25=1/x+1/y$ $\quad$ $2/25=1/13+1/325$

$2/25=1/15+1/75$

These are the only two representations for 2/25.

When investigating 2/9, ($9=3^2$, $p=3$) the equation $2/9=1/6+1/18$ does not fit into (2). When investigating 2/25, ($25=5^2$, $p=5$) the next fraction of this sequence, the equation $2/25=1/15+1/75$ also does not fit into (2). Solving the second 2/9 equation algebraically for x and y, one finds that $\frac{2}{3}x = n$ and that $\frac{1}{2}y = n$. These formulas, however, do not fit into the same pattern for 2/25, whose equations for x and y are $\frac{3}{5}x = n$ and $\frac{1}{3}y = n$.

To determine a definite pattern, it becomes necessary to examine a third example: 2/49. This is the next example of the series $n=p^2$ having $p=7$. The two possible answers for 2/49 are $2/49=1/25+1/325$ from (2) and $2/49=1/28+1/196$ from my calculating. Solving the second 2/49 equation, one finds the equations $\frac{4}{7}x = n$ and $\frac{1}{4}y = n$. The relationship becomes obvious when evaluating the examples together:

For 2/9, $x=\frac{3}{2}n$ and $y=2n$

For 2/25, $x=\frac{5}{3}n$ and $y=3n$

And for 2/49, $x=\frac{7}{4}n$ and $y=4n$.

Combined with the previous three equations, one finds that the pattern found from these examples is $x=\dfrac{\sqrt{n}}{\frac{1}{2}\left(\sqrt{n}+1\right)}$ and $y=n\dfrac{\left(\sqrt{n}+1\right)}{2}$. The equation, therefore, for this pattern is $\dfrac{2}{n}=\dfrac{1}{\dfrac{\sqrt{n}}{\frac{1}{2}\left(\sqrt{n}+1\right)}}+\dfrac{1}{n\dfrac{\left(\sqrt{n}+1\right)}{2}}$. This pattern works for all n of the series $n=p^2$ and p is an odd prime integer. To simplify this pattern, I will let $n=p^2$ in the equation.

Now I obtain the formula:

$$\frac{2}{p^2}=\frac{1}{p\frac{(p+1)}{2}}+\frac{1}{p^2\frac{(p+1)}{2}} \qquad (3)$$

- This will now be referred to as (3).

To find the general formula for all representations of 2/n where n is any power of some prime number p, we need to obtain one more set of examples. This requires working with the fractions of the series 2/n where $n=p^3$, where p again is an odd prime integer. The first three elements of this series are 2/27, 2/125, and 2/343. (Notice that the RMP stops with n=101. However, to find the algebraic patterns, it is necessary to go beyond this limit.) While examining

$2/27=\frac{2}{3^2}=1/x+1/y$, I found three answers:

2/27=1/14+1/378 – From first pattern
2/27=1/18 + 1/54 – From 2/3rds pattern and second pattern
2/27=1/15+1/135 - Trial and error

While examining $2/125=\frac{2}{5^3}=1/x+1/y$, I also found three answers:

2/125=1/63 + 1/7875 – From first pattern
2/125=1/75 + 1/375 - Second pattern
2/125=1/65+1/1625 - Trial and error

While examining $2/343=\frac{2}{7^3}=1/x+1/y$, I again found three possible answers:

2/343=1/172 + 1/58996 - From first pattern
2/343=1/196 + 1/1372 – Second pattern
2/343=1/175+1/8575 – Trial and error

From examining the results of this third series, and by repeating the steps of finding the second formula, I have obtained the formula: $\frac{2}{p^3}=\frac{1}{p^2\frac{(p+1)}{2}}+\frac{1}{p^3\frac{(p+1)}{2}}$.

Where $x=p^2\frac{(p+1)}{2}$ and $y=p^3\frac{(p+1)}{2}$.

Also, if $\frac{2}{p}=\frac{1}{\frac{(p+1)}{2}}+\frac{1}{p\frac{(p+1)}{2}}$, notice that

$$\frac{2}{p^2}=\frac{1}{p}\left(\frac{2}{p}\right)=\frac{1}{p}\left(\frac{1}{\frac{(p+1)}{2}}+\frac{1}{p\frac{(p+1)}{2}}\right)=\frac{1}{p\frac{(p+1)}{2}}+\frac{1}{p^2\frac{(p+1)}{2}}.$$ Notice that this is (3).

Thus, (3) comes from (2) very directly by algebraically multiplying both sides of the first formula by 1/p.

Example: $\frac{2}{3}=\frac{1}{\frac{(3+1)}{2}}+\frac{1}{3\frac{(3+1)}{2}}$

Multiplying by 1/3 on both sides gets the second equation for 2/9:

$$\frac{2}{9}=\frac{2}{3^2}=\frac{1}{3\frac{(3+1)}{2}}+\frac{1}{3^2\frac{(3+1)}{2}}$$

Now, multiply both sides of the two representations for $2/p^2$ by 1/p.

From, $\frac{2}{p^2}=\frac{1}{\frac{(p^2+1)}{2}}+\frac{1}{p^2\frac{(p^2+1)}{2}}=\frac{1}{\frac{p(p+1)}{2}}+\frac{1}{\frac{p^2(p+1)}{2}}$, we get two representations for $2/p^3$, namely: $\frac{2}{p^3}=\frac{1}{\frac{p(p^2+1)}{2}}+\frac{1}{\frac{p^3(p^2+1)}{2}}=\frac{1}{\frac{p^2(p+1)}{2}}+\frac{1}{\frac{p^3(p+1)}{2}}$.

The third representation for $2/p^3$, is just (2) with $n=p^3$.

$$\frac{2}{p^3}=\frac{1}{\frac{(p^3+1)}{2}}+\frac{1}{\frac{p^3(p^3+1)}{2}}.$$

When n = p^3, the three representations for 2/n are striking

$$\frac{2}{p^3}=\frac{1}{\frac{p^2(p+1)}{2}}+\frac{1}{p^3\frac{(p+1)}{2}}$$

$$\frac{2}{p^3}=\frac{1}{\frac{p(p^2+1)}{2}}+\frac{1}{p^3\frac{(p^2+1)}{2}}$$

$$\frac{2}{p^3}=\frac{1}{\frac{(p^3+1)}{2}}+\frac{1}{p^3\frac{(p^3+1)}{2}}$$

For 2/p there is one two-term representation. For $2/p^2$, there are two two-term representations. For $2/p^3$, there are three two-term representations, and so on. Therefore, for $n=p^r$, where p is an odd prime, there will be r possible Egyptian representations for 2/n.

The general expression has the form

$$\frac{2}{p^r}=\frac{1}{p^{r-s}\frac{(p^s+1)}{2}}+\frac{1}{p^r\frac{(p^s+1)}{2}}$$

where s = 1,2,3…, r.

Other 2/n fractions with multiple reciprocal representations

For other 2/n fractions, when n is not prime, there is always more than one correct representation for 1/x + 1/y. For example, while examining 2/15 =1/x +1/y, I found four possible answers.

2/15= 1/8 + 1/120	2/15=1/10 + 1/30
2/15=1/9 + 1/45	2/15=1/12 + 1/20

Notice first that 15 =3(5) so now I am working with 2/n fractions such that n= pq such that p and q are odd primes. Let p=3 and q=5.

The first answer: 1/8 + 1/120, can be found from $\frac{2}{pq}=\frac{1}{\frac{(pq+1)}{2}}+\frac{1}{\frac{pq(pq+1)}{2}}$.

Notice that this is (2) where 1/x is as large as possible.

The second answer: 1/9 + 1/45, can be found from taking the equation 2/5 = 1/ + 1/15 and multiplying 1/3.

The third answer: 1/10 + 1/30, can be found from 2/3 = 1/2 + 1/6 and multiplying both sides by 1/5. This representation would have been the one used in Egypt.

The fourth answer can be inferred by, 1/12 + 1/20 = 1/(3)(4) + 1/(5)(4)

$$=\frac{1}{3(3+5)/2}+\frac{1}{5(3+5)/2}.$$

The 4th identity suggested is $\frac{2}{pq}=\frac{1}{p(p+q)/2}+\frac{1}{q(p+q)/2}$.

While examining 2/21=1/x+1/y:

2/21=1/11+1/23	2/21=1/14+1/42
2/21=1/12+1/84	2/21=1/15+1/35

For this equation, let p =3 and q = 7. Both numbers are again odd primes, and again the only solutions for 2/21 fit the four representations given above. It is evidently a theorem that, when p and q are odd prime numbers, 2/pq has exactly four two term representations, and these are given by the following identities:

$$\frac{2}{pq}=\frac{1}{(pq+1)/2}+\frac{1}{pq(pq+1)/2},$$
$$\frac{2}{pq}=\frac{1}{p(q+1)/2}+\frac{1}{pq(q+1)/2},$$
$$\frac{2}{pq}=\frac{1}{q(p+1)/2}+\frac{1}{pq(p+1)/2},$$
$$\frac{2}{pq}=\frac{1}{p(p+q)/2}+\frac{1}{q(p+q)/2}.$$

While investigating n=45, the result of n=3*3*5, or three prime numbers, I noticed that there are seven 1/x + 1/y representations:

2/45=1/23 + 1/1035	2/45=1/30 + 1/90
2/45=1/24 + 1/360	2/45=1/35 + 1/63
2/45=1/25 + 1/225	2/45=1/36 + 1/60
2/45=1/27 + 1/135	

When investigating n=75, the result of 3*5*5, in order to confirm the conjecture, I noticed that there were again seven two-term representations:

2/75=1/38 + 1/2850	2/75=1/45 + 1/225
2/75=1/39 + 1/975	2/75=1/50 + 1/150
2/75=1/40 + 1/600	2/75=1/60 + 1/100
2/75=1/42 + 1/350	

This led me to the conjecture that if $n=p^2q$, (p and q are prime numbers) then there will be seven 2/n representations. Following the previous methods, I constructed all seven presumed identities. *The list on the following page gives all two term representations for 2/n when $n = p^2q$ and p and q are odd primes.*

$$\frac{2}{p^2q}=\frac{1}{\frac{(p^2q+1)}{2}}+\frac{1}{\frac{p^2q(p^2q+1)}{2}},$$

$$\frac{2}{p^2q}=\frac{1}{p^2(q+1)/2}+\frac{1}{p^2q(q+1)/2},$$

$$\frac{2}{p^2q}=\frac{1}{q(p^2+1)/2}+\frac{1}{p^2q(p+1)/2},$$

$$\frac{2}{p^2q}=\frac{1}{p^2(p^2+q)/2}+\frac{1}{q(p^2+q)/2},$$

$$\frac{2}{p^2q}=\frac{1}{p(pq+1)/2}+\frac{1}{p^2q(pq+1)/2},$$

$$\frac{2}{p^2q}=\frac{1}{pq(p+1)/2}+\frac{1}{p^2q(p+1)/2},$$

$$\frac{2}{p^2q}=\frac{1}{p^2(p+q)/2}+\frac{1}{pq(p+q)/2}.$$

Notice how the first four representations are very similar to the representations for the product of two odd primes.

All seven of these answers fit into the previous seven representations for $n = p^2q$. Therefore, these seven representations can be used to find the unit fraction representations for any 2/n fractions such that $n = p^2q$ with p and q being odd primes.

In every case, there is evidently a fixed set of algebraic identities for 2/n depending on the number of prime factors of n. *I will stop with the simple conclusion that when n=* p^2q, *2/n must have exactly seven two term Egyptian representations and that the number of two-term representations rises as the number of prime factors rise.*

The next question I present with this research is "Are there any similarities and identities for 3/n fractions in the form of two unit fractions 1/x and 1/y?" The list of 3/n fractions in the form of unit fractions 1/x + 1/y on the following page is what I have completed research on.

¾ = <u>1/2 + ¼</u>
3/5 = <u>1/2 + 1/10</u>
3/7 - No answer
3/10 = <u>1/10 + 1/5</u>

3/11 = <u>¼ + 1/44</u> $= \frac{3}{11} = \frac{6}{22} = \frac{12}{44} = \frac{11+1}{44} = \frac{1}{4} + \frac{1}{44}$

3/13 - No answer
3/14 = <u>1/7 + 1/14</u>
3/16 = <u>1/8 + 1/16</u>
3/17 = <u>1/6+ 1/102</u>

$$\frac{3}{17} = \frac{6}{34} = \frac{12}{68} = \frac{24}{136} = \frac{18}{102} = \frac{17+1}{102} = \frac{17}{102} + \frac{1}{102} = \frac{17}{102} + \frac{1}{102} = \frac{1}{6} + \frac{1}{102}$$

3/19 – No answer

This has led me to a few basic conclusions. First, if n is even, say n = 2m, then there is always an easy two-term representation $\frac{3}{2m} = \frac{2+1}{2m} = \frac{2}{2m} + \frac{1}{2m} = \frac{1}{m} + \frac{1}{2m}$. If n is a multiple of 3, then the fraction 3/n is simply reduced to a unit fraction. The only denominators left are those that are one more or one less than a multiple of 6. These are odd denominators, but not multiples of 3.

If the fraction is of the type $\frac{3}{6n+1}$, then there will apparently not be a two-term representation for 3/n. Certainly, there are none for small n. *This is the only case when there is no two-term representation for 3/n.*

The fraction 3/(6n-1) always has a two-term representation. The examples below when placed together are revealing:

3/5 = 3/(6-1) = 3/6 + 1/(2)(5) = 1/2 + 1/10
3/11 = 3/(12-1) = 3/12 + 1/(4)(11) = 1/4 + 1/44
3/17 = 3/(18-1) = 3/18 + 1/(6)(17) = 1/6 + 1/102

These examples lead to the following representations for 3/n:

$$\frac{3}{n} = \frac{3}{6q-1} = \frac{3(2q)}{(6q-1)(2q)} = \frac{6q-1+1}{(6q-1)(2q)} + \frac{1}{(6q-1)(2q)} = \frac{1}{2q} + \frac{1}{2qn}$$

Since 2q =(n+1)/3, we could have

$$\frac{3}{n} = \frac{1}{(n+1)/3} + \frac{1}{n(n+1)/3}. \qquad (4)$$

In retrospect, this equation could be inferred from (2). However, although (4) is algebraically valid for all positive n, we only have integer denominators if (n+1)/3 is an integer, that is, if n+1 is divisible by 3.

Also, 3/n can always be written in three unit fraction representations of the form 1/x + 1/y +1/z. This has been known since the days of Leonardo of Pisa (also known as Fibonacci), circa 1200 AD. He proved that b/c can always be represented with b or fewer unit fractions. He did this in the context of arguing that Hindu-Arabic numerals and the new fractions were handier than either Roman numerals or the commonly used Egyptian fractions.[90] Fractional representations in the RMP vary widely with the numbers used for the denominators of the reciprocal. Although many mathematicians have tried, none have successfully devised an algorithm to determine why the following representations of 2/n fractions are written in the RECTO and throughout ancient Egypt.[91]

In summary, any common fraction has infinitely many Egyptian fraction representations, but for any a/b there are a finite number having a given amount of terms. It is not known how the Egyptians found their representations, although many researchers, including myself, have attempted to discover and explore algorithms that would find the "true" explanation of the precise way the Egyptians first discovered how to write their fractions. The results and conclusions of my own research cover all odd n such that $n \leq 101$; that is, it covers all n recorded in the RMP. Many of these research attempts varied widely in the number of unit fractions calculated, the size of the denominators of the fractions, and the time taken to find the representations.[92] Dr. Epstein, through his research, compared many algorithms to find the appropriate one that the Egyptians used and came to the conclusion that there was no "one magic method" the Egyptians used to display their 2/n fractions in the RMP. "Egyptians must have used a combination of a few algorithms and often displayed the same fraction in a number of different ways."[93] On the other hand, as stated earlier, 2/n calculations were always represented exactly as in the RMP. Therefore, until someone can think of an innovational method to solve the mystery, the way that the Egyptians found the numbers in the RECTO will forever remain a mystery.

The use of auxiliary numbers for determining representations, however, can take away some of the mystery. Up until the representation for 2/29, the Egyptians strictly adhered to the use of our 2/3rds rule or by determining the binary representation for 2/n fractions. After this, however, the method of calculation changed. All calculations were given in abbreviated form. The divisions of 2 into 31 and 2 into 35 used a method introducing *Auxiliary Numbers*.[94] The following example details the use of auxiliary numbers to find unit fractions in the RECTO:

Divide 2 into 31: "Ask what part of 31 is 2?" Computation:

	31	
1/10	3 +1/10	
1/20	1 +1/2 + 1/20	✓
1/124	¼	✓ Divide answer for 1/20 by 4
1/155	1/5	✓ Divide answer for 1/20 by 5
1/20 + 1/124 + 1/155	2/31	

The obvious question from reading this representation is "How did the scribe get the idea that this answer requires ¼ and 1/5 to complete the fraction?"[95] The answer becomes even more interesting because this representation is used in both the RMP and the Egyptian Mathematical Leather Roll, showing that it must have been commonly used by scribes throughout Egypt. It appears that auxiliary numbers, such as 4 and 5 in this

[90] Resnikoff & Wells, Mathematics in Civilization – 48.
[91] Burton – 38.
[92] Epstein, Harold, The College Math Journal. vol. 22 – 13. internet source http://www.itt.edu/Math
[93] Epstein – 14.
[94] Van der Waerden, The History of Mathematics – 25.
[95] Van der Waerden, The History of Mathematics – 26.

instance, are to be looked upon as numerators of fractions that have been reduced to a common denominator.[96] In the division of 2 into 31, the sum ½ +1/20 has to be complemented to 1, and the solution given in the RMP, ¼ + 1/5, is not at all obvious to the scribe. The use of auxiliary numbers explains this rather simply.

Example: The Egyptians would say "How is ½ + 1/20 complemented to 1?"

½	1/20	(Since ½ is 10 times larger than 1/20) We get:
10	1	Sum 11, remainder 9

Now we calculate with 20 until we find 9. To do this, simply show the division of 20 by 9 below.

1	20		
½	10		
¼	5	✓	
1/10	2		
1/5	4	✓	(Multiply by 2)
¼ + 1/5	9		

This method of using auxiliary numbers helps explain the unit fractional representations for the more complicated 2/n fractions found in the RECTO and throughout ancient Egypt. In conclusion, these auxiliary numbers, combined with the 2/3rds method and the Egyptian use of binary representation for doubling and halving unit fractions, help determine all representations for the 2/n fractions found in the RECTO.

It is obvious that the Egyptians found their representations based upon the previously mentioned fraction finding rules. First, if n was divisible by 3, then the two-thirds method was used (1). Next, either (2) was used or the auxiliary method found the answers if there were more than two unit fraction representations. This is not always true, however, and to this day, no sure method has been found to tell the exact method the Egyptians used to find their unit fraction representations.

[96] Van der Waerden, <u>The History of Mathematics</u> – 26.

On this page is an English representation of the RECTO without the fractions whose denominators, n, are divisible by three.

Actual fractional representations for 2/n fractions in the Rhind Papyrus

Note (This list excludes the fractions in the papyrus whose n denominators are divisible by three – all of those fractions follow the pattern: $\frac{2}{3}\left(\frac{1}{k}\right)=\left(\frac{1}{2}+\frac{1}{6}\right)\frac{1}{k}=\frac{1}{2k}+\frac{1}{6k}$. This pattern is also mentioned earlier in the research.)

2/5=1/3 + 1/15

2/7=1/4 + 1/28

2/11=1/6 + 1/66

2/13=1/8 + 1/52 + 1/104

2/17=1/12 + 1/51 + 1/68

2/19=1/12 + 1/76 + 1/114

2/23=1/12 +1/276

2/25=1/15 + 1/75

2/29=1/24 + 1/58 + 1/174 + 1/232

2/31=1/20 + 1/124 + 1/155

2/35=1/30 + 1/42

2/37=1/24 + 1/111 + 1/296

2/41=1/24 + 1/246 +1/328

2/43=1/42 + 1/86 +1/129 + 1/301

2/47=1/30 + 1/141 + 1/470

2/49=1/28 + 1/196

2/51=1/34 + 1/102

2/53=1/30 + 1/318 + 1/795

2/55=1/30+ 1/330

2/59=1/36 + 1/236 +1/531

2/61=1/40 + 1/244 + 1/488 +1/610

2/65=1/39 + 1/195

2/67=1/40 + 1/355 + 1/536

2/71=1/40 + 1/568 + 1/710

2/73=1/60 + 1/219 + 1/292 + 1/365

2/77=1/44 + 1/308

2/79=1/60 + 1/237 +1/316+ 1/790

2/83=1/60 + 1/332 + 1/415 + 1/498

2/85=1/51 + 1/255

2/89=1/60 + 1/356 + 1/534 + 1/890

2/91=1/70 +1/130

2/95=1/60 + 1/380 + 1/570

2/97=1/56 + 1/679 + 1/776

2/101=1/101 + 1/202 +1/303 + 1/606