





"Washington Sky" by Grayson Cooper

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About the Staff



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Dr. Mabrouk is celebrating her twenty-sixth year teaching chemistry at The Citadel and her twenty-third year advising editors of The Gold Star Journal. She was raised and educated in Massachusetts at Wheaton College and the University of Massachusetts at Amherst. In her spare time, she enjoys turning wood on the lathe, scroll sawing, making soap and toiletries, and reading.

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A Letter From the Editors

“Is it hard to make The Gold Star Journal?” One of our editors was asked that question and responded with a knowing smile. “It is, but it’s great fun.”

Editing The Citadel’s only academic journal is a great privilege and a great struggle. Each year, our editors strive to showcase the best and brightest papers submitted to the Journal for consideration. In our twenty-third edition, the competition was the strongest yet.

If our journal had a theme, this year would be “Diversity.” The papers selected for publication demonstrate the wide variety of academic disciplines at The Citadel, from English to Engineering. Our published authors include both the undergraduate and graduate level. For the first time ever, The Gold Star Journal is publishing a photo story of the outstanding photo-journalism conducted by one of our cadets. We are proud to publish literary analysis of Beowulf and a study on Fetal Alcohol Syndrome in the same edition of this journal; our cadets may wear the same uniform, but they are a diverse group of students.

We would like to thank our readers for supporting the academic endeavors of cadets. As a leadership institution, our graduates serve not only in the military, but also as top-tier researchers, professors, and business professionals. They are leaders in whichever field they enter – including academics. We would also like to thank our donors and sponsors, without whom we could not continue publishing this journal.

We would also like to recognize our faculty advisor, Dr. Suzanne Mabrouk. Although the editors may rotate, Dr. Mabrouk remains steadfast in her passion for this journal. It is not an exaggeration to say that this journal would not exist without her dedication and enthusiasm.

Elijah Melendez, Editor-in-Chief

James Quimby, Editor

Hunter Crawley, Editor

Sierra Morris, Editor

Allen Holladay, Editor

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Table of Contents

Grendel: The Face of a Nation <i>Hannah M. Dion</i>	1
The Soviet Naval Strategy in the 1980's <i>Henry Brown</i>	6
ADHD and Romantic Relationships <i>Sarah Jane Walker</i>	10
American Military Drone Aircraft: A Brief Overview and Analysis of Trends <i>Alexei L. Severnyak</i>	17
Small Modular Reactors: An Emerging Technology <i>William P. Hope</i>	22
A Study in Wildlife Photography <i>William Rastberry</i>	31
The Traditions of Reformed Theology and the Institution of American Democracy <i>Aaron Michael Newton</i>	36
Fetal Alcohol Spectrum Disorder <i>Joshua Malott</i>	42
The Conundrum Called Capital Punishment <i>Joshua Kreitzer</i>	48

Grendel: The Face of a Nation

Hannah M. Dion



Hannah Dion is a freshman Biology major in Lima Company from Raleigh, NC. She has received gold stars her first semester. She is a defender on the Citadel's Division 1 women's soccer team. A member of the

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ABSTRACT

*In the poem *Beowulf*, the fearsome creature Grendel is given little background on why he attacks the Danes night after night, that is, until John Gardner writes his own novel, *Grendel*. Medieval scholars Michael Livingston and John William Sutton highlight the effect Gardner's novel has the following works of *Beowulf*-related media, but they fail to delve into the reason why Gardner portrays him in this fashion. Gardner has used the major society-altering events of the late 1960s to create a relatable story with a humanistic character who yearns to make a difference in the world.*

Grendel, the fearsome creature in the epic poem *Beowulf*, is deliberately given little background information and the audience is left to their own devices to fill in the blanks on why this one-dimensional monster wreaks havoc on the Danes¹. Modern authors have dabbled with their own ideas on Grendel's purpose, background, and motivation, but the majority of these works have followed the lead of John Gardner, who in his 1971 novel, *Grendel*, concluded that the monster greatly reflects the world that the audience themselves live in. Medieval scholars Michael Livingston and John William Sutton highlight on the significance of Gardner's novel, in regard to the many works of *Beowulf*-related media that followed it. In their article, "Reinventing the Hero: Gardner's 'Grendel' and the Shifting Face of 'Beowulf' in Popular Culture", they show the liberties that Gardner took in producing a Grendel with a future-altering history and emotional capabilities, and the collective agreement of later authors on his discretion to do so. While their point is vital and well-made for what it is, Livingston and Sutton fail to delve into the reason behind Gardner's choice to interpret Grendel in this fashion. Gardner's work, after all, does not exist in a vacuum. They neglect to comment on the similarities between Grendel's disposition and the cultural state of America during the late 1960s, which is the inspiration behind Gardner's work and the core reason why it influences *Beowulf*-related media up to this day.

Long before Gardner's explanation, the *Beowulf*-poet originally describes Grendel as a "ghastly demon" (102) who ultimately ends the joyous merriment in King Hrothgar's great hall, Heorot, by grabbing 30 thanes and bringing them back to his lair. The poet does not specify a reason, or any motivation at all, for the "savage and cruel" (122) murder

of Hrothgar's men by this "fiend from hell" (101). Grendel simply shows up out of nowhere and starts killing for seemingly no reason. Besides the fact that Grendel lives in a swamp and his relation to the sons of Cain, who are condemned and forgotten by God, there is no description of his background (103-109). By giving no background to draw a basis for the inspiration behind the attacks, the original poet has left plenty of room for the audience's interpretations.

John Gardner strays from the common idea of a mindless villain defeated by flawless hero in his novel, *Grendel*. Here, he "humanizes

this strange group. At the same time though, he is shocked and perplexed by the men's excessive, cruel violence. This is until Shaper, a court bard, sings exaggerated songs of the Danish kingdom's marvelous rise. These songs confuse Grendel, who has seen the actual, gruesome steps it has taken to get there, so he goes to the dragon for advice. The dragon says that the ways in which the men verify themselves and the rules in which they live by are futile. This taste of reality, that men hold themselves to some self-seeking standard, sparks Grendel's hatred for humans. Knowing they look down upon uneducated creatures such as himself, he takes vengeance into his own hands and attacks Heorot over and over again, not feeling any remorse or dread until Beowulf manages to bring him down by ripping off his arm. The novel ends with Grendel standing at the edge of a cliff, looking down into the murky waters below (Gardner). Grendel is seen in Gardner's work to be a creature capable of emotion, for Grendel's anger starts his terror of Heorot, fear strikes him when he is ensnared by Beowulf, and his depressed, suicidal thoughts are what bring the novel to a close. Gardner portrays Grendel making educated and thought-filled decisions, knowledgeable of his surroundings and the impact of his actions and acting on clear emotional feelings. This shifts how the whole world reads Beowulf, and, how the whole world views Grendel. From Gardner's work on, it is common knowledge that Grendel has humanistic characteristics, with an emotional background that spurs his later actions in the story, seen again and again through subsequent works of Beowulf-related media (Livingston and Sutton).

However, the reason that there had been "no real challenge to these characterizations of hero [par excellence] and [fiendish] monster" (Livingston and Sutton) up until Gardner's 1971 *Grendel* is not addressed in Livingston



Sailing scenes from *Beowulf* (Marshall)

Grendel, transforming him from an animalistic creature into a sentient being with human emotions" (Livingston and Sutton). The novel begins with Grendel as a young creature living on the outskirts of Danish civilization with his mother. He soon becomes fascinated with them, enthralled with their lifestyle, and learns some choice words from the men on the battlefield. With this taste of the common language, he yearns for more knowledge about

and Sutton's explanation. Solely focusing on the effect that Grendel has had on succeeding works, they fail to mention that the shifting cultural and political dynamics of the 1960s heavily influenced, if not inspired, Gardner's retelling, and why it was so influential.

In Grendel, Gardner echoes the ground-breaking events of the 1960s through Grendel's journey. Recalling the beginning of the novel, Grendel is living on the outskirts of the Danish civilization. This illustrates the majority of American people, who were living in poverty, that were rejected and ignored by the Republican party running the government. Both of them are, at first, fine with their role in the world, living amongst themselves, just trying to get by. However, something then catches their attention. For Grendel, it is the Danish language and lifestyle. For the nation's poor, it's the promise of true government assistance that gives them hope and inspiration for a better future. Therefore, the election of 1960 "attracted the highest rate of voter participation in half a century, marked the emergence of a glamorous new personality (John F. Kennedy), and restored to power . . . the Democrats" (Matusow). The whole country was entranced with his goals of eliminating poverty and winning the Cold War, which was against communism all around the world ("John F. Kennedy"). However, it was Lyndon B. Johnson, who became president in 1964, that created this "Great Society" promised in Kennedy's campaign. It offered a brief relief from the stress of their lives with programs such as Medicare, Medicaid, Head Start, Job Corps, and Model Cities. Soon though, this "Great Society" hit a wall.

Shortly, just like Grendel, the American citizens are shocked by the unnecessary violence that surrounds them. First, Kennedy is assassinated on live television. Then, the Vietnam War starts. A draft was enacted, and

the nation was very quickly divided due to "the Johnson administration downplay[ing] Vietnam at every critical juncture" (Zeitzy). In Grendel, he hears the highly exaggerated songs of the rise of the Danish kingdom. This is echoed by the misinformation that the American people received about the state of the fighting actually taking place, that is, until the major blow of the Tet Offensive. The Tet Offensive contradicted the easily-won, fast-paced victory Johnson had promised the people, and very quickly after this the people gained a deep mistrust in the government. The people, like Grendel, are skeptical of the information being told to them. Grendel takes his questions to the dragon to figure

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them.***

out how he should feel and what he should do about these lies, which then inspires his reaction. In the United States, the media delivered pictures and the outcome from the Tet Offensive, which turned the nation against the president, developing a strong hatred and general mistrust of the government.

This anger and hatred is exactly what develops in Grendel, which drives him to attack Heorot, the hall of King Hrothgar. Like Grendel, the people take their frustrations out by attacking the rules in which they live through large anti-war protests and the emergence of a strong counterculture among the youth of the nation, a movement studied by Bruce Schulman and others. The anti-

war protests demand the attention of the government, showing those in charge that this will not stand, and something needs to change. The counterculture is seen as “a real alternative to the corrupt, violent, greedy, tactless mainstream, [which] exerted powerful appeal” to the youth of the nation. Focusing on free love, the counterculture “reflected broader, more informal shifts in sexual mores, living arrangements, dress, food, and sexual behavior. Young people shunned long-accepted routes to social and professional success”. The culmination of these ideas was the Woodstock summer of 1969. This 3-day rock concert, which attracted 400,000 young people to stay on site and live harmoniously together, “marked ‘this generation and this culture’s’ departure from the old generation and the old

culture”. All in all, “frustration and alienation pushed Americans toward the counterculture, but also exerted a strong pull of its own: the conviction that it was possible to drop out of the polluted, corrupt mainstream and live according to one’s values”. The American people, like Grendel, took their own values in stride and took matters into their own hands to fix what they saw was wrong in the world.

The last scene in Grendel is Grendel standing at the edge of the cliff after Beowulf has ripped his arm off, looking down into the murky waters, which can be interpreted by the audience that he is contemplating whether or not to jump. This uncertainty and feeling of hopelessness echoes that of the American people. The counterculture has died out with the election of Nixon because their goals had



“Rock Arch” by Cecilia Gibson

become the common ambitions of society and rising economic troubles became everyone's main focus ("Counterculture"). With the end of an era, many felt as though "the dream of a nobler, optimistic America died, and the reality of a skeptical conservative American began to fill the void" (Schulman). These events changed the nation culturally and politically, pushing the impact of the people's values and beliefs, which inspired Gardner to take these society-altering events and transcribe them into the novel itself.

He recognized that the original author had left the character blank for a reason, and the opportunity to fill in these blanks in a productive, meaningful way presented itself.

Only focusing on the effect of Gardner's novel in the successive Beowulf-related media, Livingston and Sutton completely ignore the ramifications of the 1960s on the culture of America and the echo of these developments in Grendel. Gardner creates a relatable villain, pitted against a not-so-heroic, glorified society, which directly correlates with the world around his audience. This ground-breaking novel not only changed how the world read Beowulf but gave the youth of a tumultuous decade a strong nod of approval. Throughout Grendel's struggle, as imagined by Gardner, he thinks independently of the dominant society, challenging the ideals that they hold dear. Disagreeing with the way the Danish world works, he takes matters into his own hands to fix it. This is not only a reiteration of the driving ideals of the youth in the 1960s, but a teaching of the importance of their actions. Witnessing that the morals and norms of the country were not what they believed in, the youth acted out in defiance of those ideas. Their stance, brought into the limelight by the multitude of protests and development of the counterculture, slipped into mainstream culture, shaping the way the world worked

in the early 1970s, and the years to come. By placing these ideas in a character such as Grendel, hated and outcasted, Gardner shows his audience that anyone and everyone is allowed to have a strong set of beliefs, and that anyone can change the world.

WORKS CITED

- "The 1960s History." History Editors. History. A&E Television Networks, 25 May 2010, www.history.com/topics/1960s/1960s-history. Accessed 11 Nov. 2018.
- "Counterculture." Saylor. www.saylor.org/site/wp-content/uploads/2013/04/POLSC301-9.1.3 Counterculture.pdf. Accessed 11 Nov. 2018.
- Gardner, John. Grendel. Distributed by Paw Prints/Baker & Taylor, 2011.
- "John F. Kennedy." History.com Editors. History. A&E Television Networks, 29 Oct. 2009, www.history.com/topics/us-presidents/john-f-kennedy. Accessed 11 Nov. 2018.
- Livingston, Michael, and John William Sutton. "Reinventing the Hero: Gardner's 'Grendel' and the Shifting Face of 'Beowulf' in Popular Culture." *Studies in Popular Culture*, vol. 29, no. 1, 2006, pp. 1-16.
- Matusow, Allen J. *The Unraveling of America: A History of Liberalism in the 1960s*. University of Georgia Press, 2009, pp. xi-42.
- Marshall, Henrietta Elizabeth (1908) *Stories of Beowulf*, T.C. & E.C. Jack
- Schulman, Bruce J. "The Seventies: The Great Shift in American Culture, Society, and Politics." *The New York Times On The Web*. The New York Times Company, 2001, movies2.nytimes.com/books/first/s/schulman-01seventies.html. Accessed 11 Nov. 2018.
- Zeitz, Josh. "How Americans lost faith in government." *The Washington Post*. 30 Jan 2018,

The Soviet Naval Strategy in the 1980's

Henry Brown



Henry Brown is a Political Science and English major from St. Louis Missouri. A junior from Hotel Company, he is currently 3rd Battalion Sergeant Major and has earned Deans list every semester while at

The Citadel. His interest in naval warfare started when he first read the Hunt for Red October in 6th grade. Ultimately, Cadet Brown hopes to attend law school and become a prosecutor.

ABSTRACT

The Cold War in the 1980s represented the last time another nation could possibly contest United States naval supremacy, until today. The Soviet Navy has been written about and critiqued about its inadequacies. However, a look should be given as to what the Soviet Navy was built to achieve. This paper discusses the ways in which the Soviet Navy structured its fleet to adhere to two key strategies. Ultimately, it could be argued that the Soviet Navy was not a laughing matter in the 1980's and would have been very capable of contesting the US Navy in the North Atlantic.

During the Cold War, the Soviet Navy was considered the preeminent opponent to the NATO Naval arm, specifically the U.S. Navy. To combat NATO forces, the Soviet Navy was predominantly built to focus on two main missions in the event of war: to provide bastions in strategic locations to allow ballistic missile submarines to operate without threat from allied forces, and the use of a mix of heavily armed surface platforms, long range naval aviation, and a wide variety of submarine classes to interdict commercial traffic between North America and Europe. The successful completion of both missions, especially the latter, would have allowed the Soviet Union to have partial, if not complete, naval superiority in the North Atlantic.

The most important part of strategic deterrence is the protection of that deterrence. The Soviet Navy valued its strategic weapons to the point that the entire navy was developed for the purpose of defending areas where ballistic missile submarines could operate. This strategy first became apparent in the late 1970's: "With the commissioning of Delta-class ballistic missile submarines in the 1970s with 4,000-mile-range SS-N-8 ballistic missiles... the Soviets were configuring their fleet to complement a strategy that would establish and protect Soviet SSBN bastions." With longer range missiles, Soviet ballistic missile submarines, known as "boomers," did not have to go deep into the Atlantic or Pacific where they could be tracked and hunted by American attack submarines. Instead the Soviet boomers, starting with the Delta class and then extending into the later Typhoon class, could operate in areas such as the Baltic Sea and the Sea of Okhotsk. With the use of surface ships that were designed with Anti-Submarine Warfare (ASW) in mind, along with Naval Aviation, the Soviet boomers could be relatively protected and able to launch

their missiles at will. The emphasis placed on this mission, especially during the 1980's, was enough for the Soviet Navy to produce several classes of ships built for ASW protection: the Soviet Moskova and Kiev class helicopter cruisers, the Kresta I and II cruiser, and the Udaloy class destroyer. Focusing over a decade's worth of ship production on one strategy shows the level of commitment the Soviet Union was willing to make to ensure that its nuclear arsenal would survive an attack. Indeed, the bastion strategy would have enabled the Soviet Union to undermine NATO naval strength. With NATO attacking the local bastions, the Soviets could bring to bear a large amount of surface and aerial platforms against any opposing force. Combined with the large Soviet attack submarine force, which was both conventionally powered and nuclear powered, the Soviet Union could match NATO in strength, numerical size, and technological advancement.



A P-3 Orion overflying an Oliver Perry class Frigate, both units would have been instrumental in a U.S response to Soviet naval aggression.⁴

History has proven that a small, versatile force can be victorious against a large, cumbersome opponent. Controlling the Sea Lanes of Communication, or SLOC, between North America and Europe has been

a primary mission of both the United States Navy and the British Royal Navy since World War I. However, in the event of war, the Soviet Union would have been able to directly

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contest the control of the SLOC through the use of raiding. A similar method of Sea Lane control was utilized by the German Navy in both World War I and II. In the 1980's, the Soviet Union was comprised of subsurface and aerial platforms that “...allowed the Soviets to intercept the U.S. carriers at ranges beyond the ranges that Soviet shore-based fighters could defend missile-firing surface ships”. The submarines in question were specifically the Akula, Sierra, and Victor III SSN along with the Oscar and Charlie SSGN classes.² Like the U-boats of both World Wars, these submarines could work independently of each other and attack commercial or military shipping heading to Europe. With the use of long-range torpedoes and cruise missiles, individual submarines could attack at any point along the shipping routes. This strategy would force NATO to consolidate shipping into convoys, adopting the strategy that was so successful during the 2nd World War. Unlike in World War II, the relatively small amount of carriers available during the 1980's would be a factor working in favor of the Soviets. Using carriers to protect convoys would have forced them to be tied to a slow and relatively easy target which could be located via satellite or other maritime reconnaissance. This would

have directly placed the strategically valuable and expensive carriers in danger of not just submarines, but also formations of large missile carrying surface platforms (most likely comprised of at least one Kirov class cruiser) and aerial platforms (comprised of Tu-22M and Tu-95 long range maritime reconnaissance and attack aircraft).² Instead of risking the precious carriers, NATO would have had to rely on expendable frigates and destroyers, with most being able to carry but a single helicopter, along with possible SSN protection and light air cover through P-3 Orions and E-3 Sentry surveillance aircraft. This force, while capable, would be at risk because of the lack of frigates and destroyers needed to thoroughly protect multiple convoys of anywhere from 5 to 30 ships. The use of SSN's to protect each convoy would have been ineffective since, in the event of war, the bulk of the submarine attack force would be hunting Soviet boomers and preventing breakouts of Soviet surface platforms from the North Sea into the Atlantic (where they could similarly attack shipping or military targets at will). Additionally, the use of P-3's would have been sparse especially in the mid-Atlantic due to the long range: even with aerial refueling, aircraft can only loiter

“If a war had ever occurred, the Soviet Navy would have been in a strategically superior position.”

for a limited number of hours. The lack of available aircraft to cover not just convoys in the Atlantic but also convoys in the Pacific and other military commitments would impact the capability of the P-3 Orions. These factors

would have allowed the Soviet Navy to have had a chance in fighting for control of the SLOC's, and in turn, relative control over the North Atlantic.

During the Cold War, the Soviet Union modeled its Navy to focus on a mixture of strategic defense and maritime interdiction in the event of war. Part of this strategy



A Soviet Kirov II class guided missile cruiser.⁵

would have had the Soviet Navy protect geographically isolated areas in order to allow ballistic missile submarines the ability to launch if ever necessary. The second half of this strategy was the use of submarine, surface and air units to target and destroy NATO commercial and military sea traffic in the Atlantic. The Soviet Union focused on these two broad strategies from the mid 1970's and to the final dissolution of the Evil Empire in 1991. If a war had ever occurred, the Soviet Navy would have been in a strategically superior position. The defensive nature of the bastion strategy would have forced NATO forces to come to what was effectively the backyard (the Baltic Sea and Sea of Okhotsk) of the Soviet Union. This would have allowed the Soviet Navy to have closer ports to repair units and closer air bases to have anti-ship,

missile-carrying planes launch sorties against NATO fleet movements. Since any war in Europe would have needed American support, the Soviet Navy designed the second-half of its battle strategy to preventing transoceanic resupply. This strategy combined a mix of submarine units, surface combatants and long-range aircraft to attack convoys. In regard to the bastion strategy, it is likely that the Soviet Navy would have been able to maintain at least a portion of their bastions for ballistic missile



A U.S. Knox class frigate next to a Soviet Golf class ballistic submarine on the surface. ⁶

use since any attempt by NATO to completely sanitize the bastions of submarines would have put their valuable and limited number of vessels well within range of almost every major weapon in the Soviet military. Strategically, the sea-traffic interdiction model ensures that the availability of NATO vessels – especially the superior technology of US and UK Navies – would have been strained. It is highly unlikely that NATO could have contained every Soviet naval unit (sea or air). Therefore it can be assumed that the Soviet Navy would have been able to locate at least a portion of its fleet beyond the GIUK gap where they could be lost in either the depths of the Atlantic. With the type of submarines that were being produced (fast, deep diving, and with high torpedo and anti-ship missile loads) the Soviets would have been able to incur significant losses on these convoys with just a single vessel.

The United States Navy was a capable force in the mid 1980's. However, the Soviet Navy was just as capable for the missions it had been constructed. It is fair to say that in the event of war, Soviet boomers would have had relative free reign in their local AO's and that Atlantic convoys would have been in real danger from Soviet attack. It is clear that this strategy would have allowed the Soviets the ability to win a war in the Atlantic, and therefore the possibility of winning World War III.

BIBLIOGRAPHY

1. Winkler, David F. Cold war at sea: high-seas confrontation between the United States and the Soviet Union. Annapolis, MD: Naval Institute Press, 2000.
2. Understanding Soviet naval developments. Washington, D.C.: Office of the Chief of Naval Operations, Dept. of the Navy, 1991.
3. Watson, Bruce W., and Peter M. Dunn. The future of the Soviet navy: an assessment to the year 2000. Boulder: Westview Press, 1988.
4. P-3C Orion Maritime Patrol Aircraft. (n.d.). Retrieved February 24, 2019, from <https://www.naval-technology.com/projects/p3-orion/>
5. Epsilon. (2018, June 29). Ships of the Soviet Navy: Slava class. Retrieved February 24, 2019, from <https://battle-machines.org/2015/11/28/ships-of-the-soviet-navy-slava-class/>
6. Sputnik. (2018, August 31). Many Cold War Secrets 'Taken to The Grave' by Submariners - Naval Expert. Retrieved from <https://sputniknews.com/analysis/201808311067605870-cold-war-submarine-secrets/>

ADHD and Romantic Relationships

Sarah Jane Walker



Sarah Jane Walker is a graduate student in the M.A. in Psychology: Clinical Counseling program. She has a Bachelor of Arts degree in psychology with high honors from the University of North Florida. Her professional

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ABSTRACT

ADHD is often linked as a childhood disorder, but little is known about its effects on adults, particularly when it comes to the topic of romantic relationships. Adult ADHD has only recently emerged into recognition, yet it can pose as an issue for couples when one or more partners has the disorder. Therapeutic coping strategies for this issue exist but have little empirical support in terms of effectiveness. This paper discusses the nature of the impact that ADHD has on romantic relationships in adulthood as well as possible methods for efficient communication between couples who are impaired by the disorder.

ADULT ADHD AND ITS IMPACT ON RELATIONSHIPS

Widely associated as a childhood disorder, many studies surrounding ADHD centralize around the parent-child relationship. Less is known, however, about the impact that the disorder has on interpersonal relationships in adulthood. Recognition of the presence of ADHD in adult life has only recently commenced within the last few decades (Morrison, 2014). Although many children with the disorder outgrow their symptoms, findings now indicate that as many as 60% continue to have ADHD into adulthood (Comer & Comer, 2018). It is estimated that the sum of adults with the disorder total around 1-3% of the general population (As cited in Taylor, Deb & Unwin, 2011). This number is considerable when taking into account the level of impairment that ADHD can have against individual functionality, particularly within the realm of intimate relationships.

Characterized as a “persistent pattern of inattention and/or hyperactivity-impulsivity” (American Psychiatric Association, 2013, 59), it may come to no astonishment that ADHD can have a significantly negative impact against relationships later in life. Adults with ADHD, for instance, may often have interpersonal problems affiliated with social intrusiveness and lack of concentration (Morrison, 2014). “Their inattentiveness can result in divided attention while listening to significant others, hearing only parts of what is being communicated,” (Robbins, 2005, p. 567). Generally, the most common source of dissatisfaction in romantic relationships has to do with issues involving communication (Estrada, 2012). Given the vitality of communication in fostering close relationships, a tendency to drift and interrupt others may frequently pose as a disadvantage against individuals who struggle with ADHD symptoms.

Commonly utilized treatments for ADHD often involve a combination of drug therapy and cognitive-behavioral therapy (Comer & Comer, 2018). As many as 90% of adults with ADHD show significant impairment and would greatly benefit from treatment (Taylor, Deb & Unwin, 2011). Unfortunately, attention deficit hyperactivity disorder is still “a very much under diagnosed condition in adults” (Koemans, Vroenhoven, Karreman, & Bekker, 2015, p. 435). This is due, in part, to the disorder’s high comorbidity rate. 80% of adult patients with ADHD have one or more additional disorders such as anxiety and/or personality disorders (Koemans, Vroenhoven, Karreman, & Bekker, 2015). This would indicate that many people grappling with ADHD have additional problems to contend with, creating further social difficulty. To this extent, ADHD can inflict many adults while remaining undetected beneath the canopy of comorbid disorders. Thus, it is possible that those who struggle with ADHD without a diagnosis for it may not be receiving proper treatment for the social deficits that result from it. Consequently, many individuals might lack the aid that is needed to combat certain social inadequacies.

ADHD in adults is often associated with social rejection, poorer occupational performance and higher likelihood of unemployment (American Psychiatric Association, 2013). This downfall can have serious implications regarding whether an individual with ADHD is selected as a potential romantic partner for another person. Consistent with evolutionary psychological hypotheses, people across cultures tend to show mate preferences for strong attributes such as resource earning potential (Conroy-Beam & Buss, 2016). Therefore, the propensity for being selected as a romantic partner is not favorable for those who encounter difficulty

sustaining a career. With evolutionary guidelines under consideration, ADHD adults who fail to be autonomous would most likely encounter detriment in relation to dating and partner selection.

Measurements of autonomy and an examination of ADHD impacted individuals who possess romantic partners have been analyzed across studies. One such study conducted by Koemans and colleagues (2015) sought to measure attachment style, autonomy

“There is a cyclical pattern with ADHD, which often restricts individuals from cultivating romantic relationships.”

and psychological functioning in adults with ADHD. This study presented multiple research questions with a general hypothesis stating that adults with ADHD would be more insecurely attached, less autonomous, and possess more issues with psychological functioning than the normal population. Participants diagnosed with ADHD were recruited from a mental health institution to engage in the study. The study utilized a survey method, asking participants to complete three questionnaires. These questionnaires included The Relationship Questionnaire (related to attachment style), The Autonomy-Connectedness Scale and The Brief Symptom Inventory (Koemans et al., 2015). Results demonstrated that adults with ADHD did indeed report more insecure attachment styles than the normal population, confirming the first portion of the hypothesis. It was estimated that as many as 82% of adults with



"Crosswalk" by Grayson Cooper

ADHD were insecurely attached (Koemans et al., 2015). According to Simpson and Rholes (2017), insecure romantic attachment in adults is associated with high anxiety and a feeling of low security in relationships. This feeling may urge insecurely attached individuals to pursue closeness to a fault, whereby they repel their partners with an overwhelming sense of neediness. In a sense, this could be described as too "clingy" for some. Secondly, it was confirmed that adults with ADHD were shown to be less autonomous and less capable of managing new situations (Koemans et al., 2015). This would likely explain the impediment regarding occupational performance and job sustainment in individuals with the disorder. The third portion of the hypothesis was only partly confirmed since it was found that

psychological functioning varied greatly depending on individual levels of self-esteem. Low self-esteem, evidently, is a contributing factor to relationship deficits in individuals who have ADHD (Robbins, 2005). Given the commonality of individuals with ADHD to experience occupational and interpersonal difficulties, it should come as no surprise that most adults with the disorder are found to have reduced self-esteem (Newark, Elsasser & Stieglitz, 2016). Low self-esteem is also indicative of low psychological functioning (Koemans et al., 2015), resulting in poorer job performance and thus further interpersonal relationship difficulties. Consecutively, people with ADHD who are involved in committed relationships that lead to marriage tend to have elevated divorce rates (as cited in Newark, Elsasser & Stieglitz, 2016). Evidence seems to

suggest that there is a cyclical pattern with ADHD, which often restricts individuals from cultivating romantic relationships. This would be compatible with the claim that “symptoms of ADHD often feed into one another” (Comer & Comer, 2018, p. 529), attributable to the subject of romance as well as with functioning in everyday life.

Not all is grim, however, since there are methods of coping and combating against the adverse cycle. For instance, social support from family or friends can foster self-esteem in adults with ADHD (Newark, Elsasser & Stieglitz, 2016), thereby causing a rift in the chain reaction. Despite the difficulties, the ability to maintain a romantic relationship with ADHD remains unaffected (Newark, Elsasser & Stieglitz, 2016). This includes the capacity to give and receive love while acting with sensitivity towards other people and

“It is not beyond the bounds of possibility for adults with ADHD to lead prosperous lives and have fulfilling romantic relationships.”

their emotions (Newark, Elsasser & Stieglitz, 2016). This ability, in proper sequence, can also help adults with ADHD gain interpersonal coping strategies and self-esteem as well as improve their relationships (Newark, Elsasser & Stieglitz, 2016). Thus, it is not beyond the bounds of possibility for adults with ADHD to lead prosperous lives and have fulfilling romantic relationships.

METHODS OF COPING WITHIN ADHD RELATIONSHIPS

ADHD is a predominantly biological disorder with genetic studies suggesting a predisposition to inattentive, impulsive, and overactive behaviors (Comer & Comer, 2018). According to Franke (2015), heritability estimates of adult ADHD range between 30% and 80% across a wide variety of studies. This variation depends greatly on how many relatives have the disorder as well as the degree of the relation. For instance, there is a 30% chance of having ADHD if only one first-degree relative has it (Comer & Comer, 2018). This might indicate that sufferers of ADHD are largely at the mercy of their genetic makeup.

The processes of ADHD have neurological correlates including a dysfunctional attention circuit marked by low inter-connectivity, which is linked to poor communication (Comer & Comer, 2018). Abnormal activity of the neurotransmitter dopamine in the brain is also connected with the disorder (Comer & Comer, 2018). Since ADHD has a clear biological connection, scolding or lecturing out of frustration against a partner who has the disorder would most likely prove ineffective and result in resentment. Before utilizing behavioral interventions to manage ADHD, pharmacotherapy should be administered to work in tandem with other forms of treatment.

Medication, particularly, is essential for behavioral change. Methylphenidate and Adderall have been used as treatments of choice for ADHD (Comer & Comer, 2018). Stimulant medication is the foremost option for both children and adults with the disorder due to its proven effectiveness (Leahy, 2018). This is because the medications are presumed to increase dopamine and norepinephrine levels in the brain, which is highly effective in decreasing the symptoms of inattention and

hyperactivity-impulsivity (Leahy, 2018). In addition to pharmacotherapy, there are other methods of fostering communication for the ADHD challenged couple.

When evaluating a relationship impacted by ADHD, it is vitally important for therapists to take into consideration the unique needs of both partners. This is especially true for the non-ADHD inflicted partner who may be facing frustration and requires as much support and consideration as the partner who has ADHD (Tschudi, 2014). Often, the loved one of someone with ADHD may not feel listened to or validated. Imago Relationship Therapy (IRT) is designed to help facilitate

communication between couples so that the non-ADHD partner can feel fully heard and understood (Robbins, 2005). The neurological underpinnings of ADHD require an approach that is compatible with the challenges of the biological aspects involved. IRT does this as it is a brain-based approach that focuses on slowing the communication process between couples, providing structure and reducing reactivity while helping the ADHD inflicted adult be present and more attentive (Robbins, 2005).

The main goal of IRT is to utilize a dialogue process to educate individuals so that they might be able to learn how to



"Knobbie Walk" by Morgan Meredith

recognize when they are feeling impulsive and calm their reactivity (Robbins, 2005). This, in turn, helps the person “listen to their partner in an attempt to understand, validate, and empathize” (Robbins, 2005, p. 568). By doing this, the ADHD partner actively silences the old, reactive brain while flexing the unused muscles of the new reflective brain (Robbins, 2005). Thus, this is a process that is ADHD-friendly and helps both partners by encouraging the growth of stronger listening skills and improved self-control over symptoms.

The process of IRT requires that couples avoid attacking or criticizing one another while instead using emotion language to convey their message about a situation. Dialogue includes three parts consisting of mirroring, validating and empathizing (Robbins, 2005). During the process of mirroring, the receiver repeats back what he or she heard the other partner say. Validating occurs when the receiving partner explains what made sense in the sender’s statement. Finally, empathizing involves the receiving partner to guess how the sender must be feeling from what was heard. The partners then switch roles so that the other can express his or her message next. The overall process is simple but requires active participation from both partners to be effective. The non-ADHD partner is also encouraged to keep his or her message brief so as not to bombard the partner with ADHD by sending too much information at once (Robbins, 2005). Although IRT is practiced extensively around the world, however, it should be noted that there is a lack of research validating its effectiveness (Schmidt & Gelhert, 2017). Though the techniques of IRT can be useful for greater marital satisfaction, further empirical investigation is needed for this approach and may be worth inspecting.

DISCUSSION

The diagnosis and treatment of ADHD has historically focused primarily on children, but more is gradually being explored about the impact that the disorder has on adults (Maucieri & Carlson, 2014). Still, too few studies analyze the effects of adult ADHD on relationships and marriages (Maucieri & Carlson, 2014). Further research should be conducted to investigate the impact that ADHD has against romantic relationships and find positive solutions for the couples who face the challenges that are associated with it.

Despite this lack of research, utilizing IRT has still been said to foster communication to the extent that it facilitates a connection that most typical conversations do not possess (Robbins, 2005). In this regard, it could be suggested that a successfully functioning ADHD relationship has the potential for greater satisfactory than a typical relationship. This would be due mainly to the amount of effort that is put forth from each partner to understand one another, creating a more meaningful bond. Therefore, the presence of ADHD does not necessarily have to determine the downfall of a romantic relationship. Under the right perspective, ADHD can be viewed as a problem that is external to the sufferer, a reason for couples to grow closer through the process of working together against the disorder.

REFERENCES:

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.)
- Comer, J.R. & Comer, S.J. (2018). *Abnormal Psychology*. New York, NY: Worth Publishers
- Conroy-Beam, D., & Buss, D. M. (2016). How are mate preferences linked with actual mate selection? Tests of mate preference integration algorithms using computer simulations and actual mating couples. *PLoS ONE*, 11(6).
- Estrada, M.-J. (2012). Romantic communication in intimate relationships: The romantic construal model. In M. A. Paludi (Ed.), *The psychology of love*, Vols. 1-4. (pp. 125–139). Santa Barbara, CA: Praeger/ABC-CLIO.
- Franke, B. (2015). ADHD across the lifespan—IMpACT on genetics of adult ADHD. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics*, 168(6), 403–405.
- Koemans, R. G., van Vroenhoven, S., Karreman, A., & Bekker, M. H. J. (2015). Attachment and autonomy problems in adults with ADHD. *Journal of Attention Disorders*, 19(5), 435–446.
- Leahy, L. G. (2018). Diagnosis and treatment of adhd in children vs adults: What nurses should know. *Archives of Psychiatric Nursing*.
- Maucieri, L., & Carlson, J. (2014). *The distracted couple: The impact of ADHD on adult relationships*. (L. Maucieri & J. Carlson, Eds.). Norwalk, CT: Crown House Publishing Limited.
- Morrison, J. (2014). *DSM-5 Made Easy*. New York: NY: The Guilford Press
- Newark, P. E., Elsässer, M., & Stieglitz, R.-D. (2016). Self-esteem, self-efficacy, and resources in adults with ADHD. *Journal of Attention Disorders*, 20(3), 279–290.
- Robbins, C. A. (2005). ADHD Couple and Family Relationships: Enhancing Communication and Understanding Through Imago Relationship Therapy. *Journal of Clinical Psychology*, 61(5), 565–577.
- Schmidt, C. D., & Gelhert, N. C. (2017). Couples therapy and empathy: An evaluation of the impact of imago relationship therapy on partner empathy levels. *The Family Journal*, 25(1), 23–30.
- Simpson, J. A., & Rholes, W. S. (2017). Adult attachment, stress, and romantic relationships. *Current Opinion in Psychology*, 13, 19–24.
- Taylor, A., Deb, S., & Unwin, G. (2011). Scales for the identification of adults with attention deficit hyperactivity disorder (ADHD): A systematic review. *Research in Developmental Disabilities*, 32(3), 924–938.
- Tschudi, S. (2014). The impact of ADHD on the other partner. In L. Maucieri & J. Carlson (Eds.), *The distracted couple: The impact of ADHD on adult relationships*. (pp. 249–278). Norwalk, CT: Crown House Publishing Limited.

American Military Drone Aircraft: A Brief Overview and Analysis of Trends

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ABSTRACT

Technological progress invariably impacts the way wars are fought. In turn, how a nation fights wars is reflected on the home front. Drones represent one such new technological advancement, one with great potential to revolutionize modern war-fighting. This report examines the history and state of the art of the drones currently in American military service, and the variety thereof. The report then goes on to discuss the advantages and disadvantages inherent to drones, both in terms of practical considerations for strategic- and tactical-level commanders, as well as broader implications for lawmakers and society at large.

I. INTRODUCTION

Ever present resource scarcity and ideologically-motivated hate have driven warfare historically, and will continue to do so for the foreseeable future. As society and warfare continue to evolve, drone-driven warfare presents an opportunity to fight cleaner, cheaper, more flexible wars.

The way that wars are fought has an impact not only on the military establishment and military-industrial complex, but also on many other tangentially-related facets of society. A nation that fights inexpensive, low-impact wars enjoys the benefits of cost saving which can be passed on to the taxpayer, and a cleaner image abroad, thanks to reduced casualties, both military and civilian. A nation that fights this way mitigates financial impact, decreases the frequency of unfortunate collateral damage, and returns more men and women in uniform home when the fighting is done. To this end, the wars of today are largely small-scale, and fought not with large, conventional invasion forces, but with surgical options, for which drones present a unique set of capabilities, and thus opportunities.

For the purposes of this report, a drone is an unmanned aircraft or ship guided by remote control or onboard computers. For military drones, this definition is often shortened to include just unmanned aircraft, used for such activities as transport, reconnaissance, electronic warfare, and the delivery of munitions.

This report provides an overview of the state of the art in modern American military drones, and analyses current trends and points of interest in the field. Following a short history of military drones, both the positive and negative aspects of modern drone warfare will be examined, and the future of this technology explored.

II. A BRIEF HISTORY OF DRONE WARFARE

The first drones, for example the American “Kettering Bug,” were developed during World War I [1]. Between the World Wars, development of drones continued, most notably as aerial training targets for pilots [1]. The first significant operational use of drones occurred during the Vietnam War, where they were used in a reconnaissance capacity, but also to deliver munitions, on occasion [1]. Following the Vietnam War, drone technology began to finally come into its own, and began to be seen as having an important and legitimate role alongside human-operated airframes [1]. Drones continued to develop, to the point that they are now used often in reconnaissance and precision strike roles, and have several advantages over human pilots, including loiter time, lack of fatigue, and relative expendability. Drones continue to advance, and have recently attained several new milestones, such as landing autonomously on an underway aircraft carrier [2] and scoring an air-to-air kill on another aircraft [3].

III. DIFFERENT TYPES OF DRONES AND ASSOCIATED MISSION SETS

Drones, like manned aircraft, come in many varieties, each designed to fit a specific mission set. What follows is a selection of five drones employed by the US military, each representing a unique drone archetype. The most common drone in the US Air Force’s inventory (with a fleet of 150 [4]) is the General Atomics MQ-1B Predator. The Predator is employed to provide “armed reconnaissance, airborne surveillance, and target acquisition” [4]. It represents a general-use drone, and can perform a wide variety of missions effectively, however does not specialize in any particular task. The next unmanned airframe in the American arsenal is the General Atomics MQ-9 Reaper. The



Predator Drone [13]

Reaper is a dedicated strike drone, and carries a much greater munitions payload than the Predator [5], however does not share the same degree of Intelligence, Surveillance, and Reconnaissance (ISR) capabilities, and thus is more limited in scope of operations. The USAF also operates the Northrop-Grumman RQ-4 Global Hawk. The Global Hawk is a dedicated intelligence-gathering platform



UAV Launch [14]

with a significant loiter time, and carries no armament [6]. It serves as an opposite counterpart to the Reaper, possessing a high degree of ISR specialization and no strike capability. The AeroVironment RQ-11 Raven,

employed by the US Army and US Marines, represents a more unique species of drone. Unlike the previous platforms, which are sized similarly to manned counterparts, the Raven is relatively small, with a 4.5 ft. wingspan [7]. The Raven carries no armament, and is used solely for reconnaissance and battle damage assessment [7]. The last UAV to be covered in this report is extremely unusual, because as opposed to most drones, it is disposable. The AeroVironment Switchblade is what is called a “loitering munition,” for practical purposes a missile that can wait for an extended period of time before hitting its target, or can be called off entirely [8] should conditions warrant it. This gives tactical-level leaders great flexibility with organic precision strike capability.

IV. A BRIEF OVERVIEW OF POSITIVE IMPACTS OF COMBAT DRONE USE

Drone use brings local combatant commanders a high degree of flexibility when employing ISR and/or precision strike capabilities, allowing the desired end state to be achieved in ways that were previously impossible, or which would have required the involvement of higher-level assets, such as destroyers, guided missile submarines, a carrier air wing, or land-based manned aircraft. Additionally, drones have a greater measure of expendability, as no human pilot is lost if a drone suffers a computer or mechanical failure or is shot down in combat. Finally, drones are significantly less expensive than comparable manned systems [5].

V. A BRIEF OVERVIEW OF NEGATIVE IMPACTS OF COMBAT DRONE USE

Drones present several complicated ethical issues. The first is a disassociation from war, and a subsequent trivialization thereof. When wars can be fought by machines from

thousands of miles away, there is less of an impact on the home front. The public forgets the costs of a war, and is more readily supportive of the use of this variety of force to achieve a political end-state. Additionally, this variety of ‘faceless war’ can be used as a propaganda tool by the enemy, working counter to the very political goals modern, counter-insurgency operations seek to achieve [9]. The next issue, which will become ever more relevant as drones become even more autonomous, is the question of whether or not it is ethical to allow a computer to perform a combat kill of a human enemy without human input. Such an act is comparable to outsourcing the right to live to an inhuman entity. Lastly, there is the issue of creating weapons that will make human-operated systems obsolete. Should



UAV [15]

control over these systems ever be lost, the consequences could be dire, assuming the capabilities and freedoms of these weapons continue to improve past those of their human-piloted counterparts.

VI. THE FUTURE OF DRONE WARFARE

Drones are a very effective, and very promising weapon system in terms of objective lethality. They will likely continue to progress, and will take over more and more mission sets from their human counterparts. Further speculative developments could include swarms of micro-drones [10], dedicated air-to-air dogfighter drones, and unmanned hypersonic long-range strategic strike platforms.

VII. DISCUSSION

Drone combat will, for the foreseeable future, remain an integral tool in the toolbox of both tactical- and strategic-level leaders seeking to leverage advanced ISR (which is increasingly

“As society and warfare continue to evolve, drone-driven warfare presents an opportunity to fight cleaner, cheaper, more flexible wars.”

important in the modern, multidimensional battlespace [11]), precision strike, and possibly even air-to-air capabilities, as it has been thus far. Drones allow the combatant commanders of today to employ, organically, capabilities which in the past would have required the employment of significant outside assets and complex coordination between multiple agencies with differing procedures and desired end states. Drone warfare decreases collateral damage, taxpayer burden, and most importantly, local commander dependency on outside assets, making for cleaner, cheaper, more flexible warfare. This new tool is not, however, without its own unique drawbacks.

The detached and ‘faceless’ nature of drone conflict can lead to a dissociation from the conflict on the part of those on the home front. The war carries no costs, and the public does not feel its effects, and life continues as though there were no war at all. Such a mind-set is not ethically sound in that it causes the public to more readily accept, or even to ignore, armed conflict as a solution to an international dispute, which in turn is counterproductive to domestic political discourse as to whether or not such a conflict is right, moral, and/or legal in the first place. Additionally, though drones can be employed as friendly propaganda tools by dropping leaflets or aid [12], they can also be a propaganda tool for the enemy. If the only sign of friendly forces that a populace sees are drones, an insurgency can shape this perception to dehumanize them in their eyes, thus gaining a propaganda victory.

Lastly, allowing future iterations of drones, ones with more advanced AI, greater autonomy could be a grave mistake, should control over those systems ever be lost, be it by programming error or enemy action. It is important to note, however, that nearly all of the negative aspects of drone warfare presented in this report are not failures of the drone as a technology or as a weapon system, but rather ethical dilemmas for policy makers and ethics committees to ponder. From a purely technical standpoint, however, the future looks promising for drone warfare, and many new prospective developments such as advanced AI, micro-drone swarms, and dogfighting drones will likely continue to keep this technology on the bleeding edge of modern war fighting for decades to come.

REFERENCES

- [1] "A Brief History of Drones," Imperial War Museum, London, England. 2018. [Online]. Available: <https://www.iwm.org.uk/history/a-brief-history-of-drones>. [Accessed Nov. 16 2018].
- [2] "X-47B Operates Aboard Theodore Roosevelt," Navy News Service, USS Theodore Roosevelt Public Affairs, USS Theodore Roosevelt. 2013. [Online]. Available: https://www.navy.mil/submit/display.asp?story_id=77580. [Accessed Nov. 16 2018].
- [3] "A Reaper Drone Shot Down Another Drone in First Unmanned Air-to-Air Kill," Kyle Mizokami, Popular Mechanics, New York, NY. 2018. [Online]. Available: <https://www.popularmechanics.com/military/aviation/a23320374/reaper-drone-first-unmanned-air-to-air-kill/>. [Accessed Nov 16, 2018].
- [4] "MQ-1B Predator," US Air Force Public Affairs Agency, Joint Base San Antonio - Randolph, TX. 2015. [Online]. Available: <https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104469/mq-1b-predator/>. [Accessed Nov. 16 2018].
- [5] "MQ-9 Reaper," US Air Force Public Affairs Agency, Joint Base San Antonio - Randolph, TX. 2015. [Online]. Available: <https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104470/mq-9-reaper/>. [Accessed Nov. 16 2018].
- [6] "RQ-4 Global Hawk," US Air Force Public Affairs Agency, Joint Base San Antonio - Randolph, TX. 2014. [Online]. Available: <https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104516/rq-4-global-hawk/>. [Accessed Nov. 16 2018].
- [7] "UAS: RQ-11B Raven®," AeroVironment, Inc., Simi Valley, CA. 2018. [Online]. Available: <https://www.avinc.com/uas/view/raven>. [Accessed Nov. 16 2018].
- [8] "Switchblade®," AeroVironment, Inc., Simi Valley, CA. 2018. [Online]. Available: <https://www.avinc.com/uas/view/switchblade>. [Accessed Nov. 16 2018].
- [9] Kilcullen, D. and McDonald Exum, A., 2009, "Death from Above, Outrage Down Below," The New York Times
- [10] Burkle, A., Segor, F., and Kollmann, M., 2010, "Towards Autonomous Micro UAV Swarms," J Intell Robot Systems, 1(61) 339-353
- [11] Kindervater, K. H., 2016, "The Emergence of Lethal Surveillance: Watching and Killing in the History of Drone Technology," Security Dialogue, 47(3) 223-238
- [12] Tluchowski, LCDR M. A., 2002, "The UAV and the Operational Commander," Dissertation, Department of Joint Military Operations, Naval War College
- [13] Predator Drone. Digital image. Accessed February 24, 2019.
- [14] UAV Launch. Digital image. Accessed February 24, 2019.
- [15] UAV. Digital image. Accessed February 24, 2019.

Small Modular Reactors: An Emerging Technology

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ABSTRACT

This paper discusses the development of small modular reactor technology and how this technology differs from traditional nuclear power. Small modular reactors have been suggested as an option to tackle global reliance on fossil fuels for power generation. The focus these reactors place on safety and versatility have the potential to make them the future of nuclear power.

I. INTRODUCTION

The modern world is reliant on a consistent supply of energy. Since the construction of the domestic power grid, access to electricity has become a hallmark of the developed world. Trends show that world energy consumption is increasing. Data collected by the International Energy Association (IEA) shows that between the

“The Intergovernmental Panel on Climate Change (IPCC) reports energy production is the leading source of man-made carbon emission, contributing ~35% of global greenhouse gas output worldwide.”

years of 1990 and 2008, global energy use per capita has increased by 10%, accompanied by a 27% increase in global population [1]. Member nations of the Organization for Economic Co-operation and Development (OECD) consumed 9,512 Terawatt hours (TWh) in 2016 and have experienced an average 3.3% increase in energy consumption per year between 1974 and 2016 [2]. This trend has put a strain on power generation infrastructure which is a leading contributor to global CO₂ emissions. The Intergovernmental Panel on Climate Change (IPCC) reports energy production is the leading source of man-made carbon emission, contributing ~35% of global greenhouse gas output worldwide [3]. Therefore, to reduce global carbon emissions and meet rising power demands, governments

must invest in methods of electrical production with minimal carbon footprints. One such method is production through nuclear power plants.

Nuclear power has many advantages over other forms of alternate energy like solar and wind, namely, that it is not dependent on environmental factors. In the United States, nuclear power plants account for 20% of electrical production with each plant producing ~ 1 GW of power [4]. However, nuclear power plants do possess a number of drawbacks; capital investment, plant size, specialized engineering, and environmental concerns to name a few. In order to increase the applicability of nuclear power, a new reactor type referred to as small modular reactors (SMR)s are gaining traction.

The International Atomic Energy Association (IAEA), defines an SMR as “advanced reactors that produce electricity of up to 300 MW(e) per module” [5]. These reactors are designed to be constructed off-site and transported to their location of operation. These designs tend to place an emphasis on safety, reliability, and ease of installation. Because of this, SMR designers seek to provide greater geographic flexibility for isolated or underdeveloped regions [6]. The reduced size of SMRs also means that they typically have a lower initial investment when compared to traditional reactor designs.

II.COMPONENTS OF NUCLEAR REACTOR DESIGN

While there are hundreds of different designs for fission reactors, almost all designs possess the same fundamental design elements. These are the reactor core, coolant, and moderator.

A. Core Type and Purpose

The reactor core is where the fuel undergoes fission and produces thermal energy. The core consists of a pressure vessel which houses the fuel rods and control rods. The fuel rods contain the material undergoing



Uranium Disk [39]

fission. The control rods are constructed out of a material with a large cross section for neutron absorption such as hafnium, boron, and cadmium [7].

1) Breeder Reactors: Breeder reactors are used to convert a fissionable material to a fissile material. Typically, U238 will be converted to Pu239 through neutron capture. The Pu239 can then be used as fuel in a reactor or used in the production of nuclear weapons. Due to the potential for nuclear proliferation, the use of commercial breeder reactors is widely contested [8].

2) Burner Reactors: Burner reactors are a type of reactor designed with the primary purpose of energy production. These reactors use a fissile fuel mixture, typically enriched uranium, to generate energy [9].

3) Converter Reactors: Converter reactors operate in a manner similar to breeder

reactors in that they create fissile material. The difference in the case of converters is that they use this material as additional fuel to further power the core [10].

B. Coolant

The reactor coolant serves two main purposes, transfer thermal energy from the core to the generator turbines and maintain a safe reactor temperature [11]. Various coolants are used in reactor designs, each having advantages and disadvantages.

1) Light Water: Natural water (H_2O), referred to as light water to distinguish it from heavy water ($2H_2O$). Light water is the most commonly used reactor moderator [12]. Light water has many advantages, it is radiologically stable, its chemical properties are well understood, and it is inexpensive.

2) Heavy Water: Deuterium Oxide ($2H_2O$), commonly referred to as heavy water, is a chemical formed by replacing the hydrogen atoms of a water molecule with the hydrogen isotope deuterium.

3) Other Coolants: Excluding those previously discussed, there are a few other coolants used in commercial reactors. These include molten sodium and carbon dioxide which constitute a small fraction of active reactors.

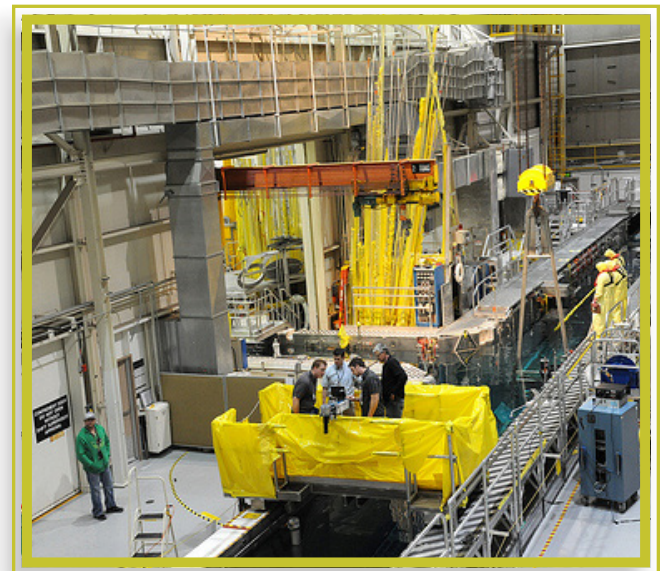
C. Neutron Moderator

Neutrons can exist at various energy levels, referred to as neutron temperature. The cross section for absorption of a given fuel is dependent on the kinetic energy of the neutron [13]. In order to produce an efficient rate of fuel fission, the fast neutrons released from fission must be slowed. These neutrons are referred to as thermal neutrons and this slowing is the role of the moderator. Many reactor designs

will use a single substance which serves as both the coolant and moderator.

1) Light Water: The use of light water as a moderator carries many of the same benefits of a light water coolant, namely, stability, availability, and cost.

2) Heavy Water: When compared to light water, heavy water is a vastly superior neutron moderator [14]. Heavy water is such an effective neutron moderator that heavy water reactors can use natural uranium as fuel, eliminating the cost of enrichment. This however, requires the production of heavy water which can be prohibitively expensive [15]. The most notable commercial heavy water reactor would be the Canadian Deuterium (CANDU) series.



Nuclear Fuel Inspection Training [40]

III. TRADITIONAL REACTOR DESIGNS

While there exists a large variety of reactor designs, most commercial reactors use light water as both a coolant and moderator. The most common sub-types of light water

reactors are the boiling water reactor and the pressurized water reactor.

A. Boiling Water Reactors (BWR)s

In a BWR, steam generation occurs in the reactor pressure vessel. This steam is directly supplied to the turbines to generate electricity. This design minimizes the number of moving parts in the nuclear steam supply system (NSSS), reducing the likelihood of mechanical failure [16]. Because BWRs use a single loop thermal hydraulic system, all components of the NSSS are subject to radiological exposure from the core making radiation containment a concern. Due to their high operating temperatures, BWRs have an average efficacy of ~ 34% [17].

B. Pressurized Water Reactors (PWR)s

“SMRs have the potential to provide power where the construction of larger plants would not be feasible [20]. SMRs would be able to supply power to remote areas without the need for large scale fuel supply chains.”

Pressurized water reactors or PWRs are the most common form of reactor in commercial energy production [18]. Unlike BWRs, PWRs consist of two distinct loops, one containing pressurized water flowing from the reactor to the steam generator (primary)

and another from the steam generator to the generator turbines (secondary). The high pressure in the primary loop prevents the water from boiling in the reactor vessel. The steam generator allows for heat transfer from the primary loop to the secondary loop where boiling occurs [19]. Because these loops are separated, all water that enters the reactor core is isolated in the primary loop. Therefore, the rest of the NSSS is not exposed to radiation unlike BWRs.

IV. APPLICATION OF SMALL MODULAR REACTORS

In recent years, there has been an increased desire to develop SMRs using both new and existing reactor technology across all reactor sub-types. SMRs have the potential to provide power where the construction of larger plants would not be feasible [20]. SMRs would be able to supply power to remote areas without the need for large scale fuel supply chains. The off-site construction of SMR's allows for purpose-built design infrastructure to serve multiple distinct reactor sites.

A. Land-Based SMRs

The majority of SMRs currently in development are land based models [21]. These designs fit the roll that has traditionally been filled by large reactors and non-nuclear power plants. Modularity is a key aspect of SMR design philosophy that allows for the production and assembly of key reactor systems at a dedicated fabrication site [22]. These components can then be transported to the intended reactor site. This reduces the amount of labor and specialized equipment required for reactor installation.

Land-based SMRs have the advantage of scalability, using multiple SMRs operating in parallel to achieve a desired level of power

output. If the demand for power increased, a land-based plant could add more SMRs to their layout rather than constructing an entirely new reactor facility [23]. SMR design allows for SMRs to be installed in existing reactor facilities. In contrast to a traditional plant, this would allow for the maintenance or replacement of a single reactor while allowing the others to continue to operate. Newer generations of reactor could be installed in place of older reactor without the need for construction of an entirely new reactor facility.

SMRs are better suited to power operations in remote regions. The Ontario Ministry of Energy published a feasibility study in which they recommend the use of SMRs to power remote mining operations in the ring of fire region of northern Ontario [24]. Without access to a power grid, these mining operations currently rely on multiple diesel gensets to fulfill energy demand. The necessary diesel fuel is shipped on barges to the mining sites [25]. The installation of SMRs has the potential to greatly increase the energy independence of these remote sites.

B. Marine SMRs

SMRs have been proposed for use in commercial ship propulsion. Nuclear propulsion systems have been successfully operating in military vessels since the 1960's. The emphasis SMR designers place in simplicity and ease of operation make their implementation in the civilian ship design feasible. Large specialize ships such as Ultra Large Crude Carriers (ULCC)s and icebreakers could benefit greatly from the energy sustainability afforded by SMRs [26].

Operational benefits aside, seaborne SMR technology serves to curb fossil fuel emissions. A 2009 International Maritime Organization (IMO) report cited commercial

shipping as the contributor of ~3.3% of global CO2 emissions [27]. This figure places shipping as the six highest contributor of anthropogenic emissions when compared to all countries. Emissions from shipping are predicted to increase 119% - 204% between 2007 and 2050 [28]. With an approximate total power capacity of 410 GW(t) [29], merchant shipping requires a long-term solution that minimizes emissions while still fulfilling large power requirements. Table 1 compares the emission of various types of ship propulsion [30].



Trojan Nuclear Power Plant [41]

V. BENEFITS OF SMALL MODULAR REACTORS

While providing flexible deployment options, SMRs have several unique advantages over tradition large nuclear plants.

A. Production and Installation

SMR components are factory constructed and transported to the final reactor site [31]. This reduces the time and complexity of construction. Factory construction also allows for greater manufacturing precision

in a controlled environment. This allows for improved quality control, reliability, and oversight by regulatory authorities.

B. Economic Viability and Capital Investment

The reduced construction timeline of SMRs translates to smaller up-front cost to investors. SMRs are predicted to be economically competitive with conventional reactor facilities by compensating for lack of reactor size with an increased number of units [32]. Furthermore, because fuel cost is a significantly smaller portion of nuclear reactor operating costs, SMRs are less susceptible to fluctuations in fuel cost when compared to natural gas and coal [33]. A 2018 IAEA case study which looked to economic indicators to determine likely candidates for SMR deployment identified various economic factors that would promote SMRs [34]. It identified emerging industrialized economies and highly developed infrastructure economies as the most likely candidates for SMR development.

SMR plants constructed with multiple cores exhibit a redundancy that increases their reliability. If a single reactor must shutdown for refueling or maintenance, the others can continue to operate and generate revenue.

C. Safety in Design

Due to their reduced size, safety features for SMRs can generally be simplified when compared to traditional reactors. Safety features can be classified in two ways; active which require operator intervention to activate and passive which do not require operator intervention. Many SMR designs place an emphasis on passive safety features. Features like passive heat removal allow coolant circulation without external power by means of gravity, convection, or evaporation [35]. This allows the SMR to operate safely with minimal human intervention. SMRs are

easier to passively cool because heat can be more effectively removed from the surface of smaller systems [36]. For example, multiple reactors placed in a large pool of water would be better able to radiate heat than traditional nuclear power plants while outputting the same amount of power. This increases the time required for a core meltdown, thus extending the time to mitigate such an incident.

VI. OUTLOOK

SMRs have the potential to reduce emissions, increase reactor safety, and have application in areas inaccessible to traditional reactors. In 2012 the US Department of Energy initiated the SMR Licensing and Technical Support (LTS) program to assist SMR developers with overcoming economic and regulatory barriers to bringing SMRs to market [37]. The Nuclear Regulatory Commission (NRC) predicts a rollout of commercial SMRs in the next 10 – 15 years [38].

“SMRs have the potential to reduce emissions, increase reactor safety, and have application in areas inaccessible to traditional reactors.”

VII. ANNEX

A. Acronyms

BWR	Boiling water reactor
GW	Gigawatt
GW(t)	Gigawatt (thermal)
IAEA	International Atomic Energy Association
IEA	International Energy Agency
IMO	International Maritime Organization
IPCC	International Atomic Energy Association
MW(e)	Megawatt (electric)
NRC	Nuclear Regulatory Commission
NSSS	Nuclear Steam Supply System
OEDC	Organization for Economic Co-operation and Development
PWR	Pressurized water reactor
SMR	Small modular reactor
TWh	Terawatt hour
ULCC	Ultra Large Crude Carrier
USDOE	United States Department of Energy

VIII. REFERENCES

- [1] "Key World Energy Statistics", International Energy Agency (2018)
- [2] International Energy Association, Nordic EV Outlook 2018: Insights from leaders in electricity mobility., 2018,
- [3] Bruckner T., I. A. Bashmakov, Y. Mulugetta, H. Chum, A. de la Vega Navarro, J. Edmonds, A. Faaij, B. Fungtammasan, A. Garg, E. Hertwich, D. Honnery, D. Infield, M. Kainuma, S. Khennas, S. Kim, H. B. Nimir, K. Riahi, N. Strachan, R. Wiser, and X. Zhang, 2014: Energy Systems. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- [4] M. Mueller, (2018), How Much Power Does a Nuclear Reactor Produce, USDOE Website [Online]
- [5] (2002) Small modular reactors, IAEA Website [Online].
- [6] H. (International A. E. A. Subki and F. (International A. E. A. Reitsma, "Advances in Small Modular Reactor Technology Developments," p. 150, 2018.
- [7] (2018), Control Rods, Nuclear_Power.net [Online]
- [8] Andrew Karam (2018), How do fast breeder reactors differ from regular nuclear power plants?, Scientific American [Online]
- [9] (2018), Thermal, intermediate, and fast reactors, Encyclopedia Britannica Website [Online]
- [10] (2018), Converter reactor, European Nuclear Society Website [Online]
- [11] Omar, Suraya (2011), Nuclear Reactor Coolants, Stanford University Website [Online]
- [12] Omar, Suraya (2011), Nuclear Reactor Coolants, Stanford University Website [Online]
- [13] (2014), Neutron Moderator, Nuclear Power.net Website [Online]
- [14] British Nuclear Energy Society, Steam Generating and Other Heavy Water Reactors (Proceedings of a Conference held at the Institution of Civil Engineers,

- May 1968), available from the British Nuclear Energy Society, Great George Street, London.
- [15] Omar, Suraya (2011), Nuclear Reactor Coolants, Stanford University Website [Online]
- [16] GE Hitachi (2010), Advantages of Boiling Water Reactors (BWR), General Electric Website [Online]
- [17] J.R. Lamarsh and A.J. Baratta, "Power Reactors and Nuclear Steam Supply Systems" in Introduction to Nuclear Engineering, 3rd ed., Upper Saddle River, NJ: Prentice Hall, 2001, ch.4, sec.5, pp. 136-185
- [18] Zarubin, Bobby (2016), Introduction to Light Water Reactors, Stanford University Website [Online]
- [19] J. A. Dahlheimer, E. E. Elhauge, L. Greenberg,, J. H. Jacos, W. J. Kabbert, H. R. Keel, G. C. Masche, C. N. Moran, D. H. Petrie, R. Seid, (1984), The Westinghouse Pressurized Water Reactor Nuclear Power Plant, Westinghouse Electric Corporation Water Reactor Divisions
- [20] Advances in Small Modular Reactor Technology Developments, International Atomic Energy Association (2018)
- [21] Ibid.
- [22] Benefits of Small Modular Reactors (SMR)s, United States Department of Energy Website [Online]
- [23] Advances in Small Modular Reactor Technology Developments, International Atomic Energy Association (2018)
- [24] Ontario Ministry of Energy - SMR Deployment Feasibility Study Feasibility of the Potential Deployment of Small Modular Reactors (SMRs) in Ontario – (02 June 2016)
- [25] Ibid.
- [26] Hoque, M. , Salauddin, A. and Khondoker, M. (2018) Design and Comparative Analysis of Small Modular Reactors for Nuclear Marine Propulsion of a Ship. World Journal of Nuclear Science and Technology, 8, 136-145. doi: 10.4236 /wjnst.2018.83012.
- [27] IMO, 2009, Prevention of Air Pollution from Ships, Second IMO GHG Study 2009 – Final Report Covering Phase I and II, MEPC 59/INF.10
- [28] OECD/IEA, 2008. Energy Technology Perspectives 2008. Scenarios and Strategies to 2050. Executive summary document in support of the G8 plan of action.
- [29] Ibid.
- [30] Gravina, J., Blake, J.I.R., Sheno, A., Turnock, S.R., Hirdaris, S.E., 2012. Concepts for a modular nuclear-powered containership. In: 17th International Conference on Ships and Shipping Research (NAV 2012), Napoli, Italy.
- [31] 4 Key Benefits of Advanced Small Modular Reactors (SMR)s, United States Office of Nuclear Energy Website [Online] [32] International Atomic Energy Association, Deployment Indicators for Small Modular Reactors Methodology, Analysis of Key Factors and Case Studies, (2018)
- [33] Pratson, L., Haerer, D., Patino-Echeverri, D., Fuel prices, Emission Standards, and Generation costs for coal vs. natural gas power plants, Environmental Science and Technology, 47 9 (2013) 426–433 pp.
- [34] International Atomic Energy Association, Deployment Indicators for Small Modular Reactors Methodology, Analysis of Key Factors and Case Studies, (2018)
- [35] Ibid.
- [36] D. T. Ingersoll, Oak Ridge National Laboratory Passive Safety Features for Small Modular Reactors (2010)
- [37] Benefits of Small Modular Reactors (SMR)s, United States Department of Energy Website [Online]
- [38] Ibid.
- [39] Uranium Disk. Digital image. Accessed February 24, 2019.
- [40] Nuclear Fuel Inspection Training. Digital image. Accessed February 24 2019.
- [41] Trojan Nuclear Power Plant. Digital image. Accessed February 24 2019.



"The Giant's Causeway" by Jeff Simon

A Study in Wildlife Photography

William Rasberry



THE GSJ DISTINCTION IN PHOTOGRAPHY

William Rasberry is a senior Business Administration major from Charlotte, North Carolina. A member of Oscar Company, William hopes to pursue a career in Business Consulting and Analysis after graduation. William

spends his free time as a Wildlife Photographer, travelling to Africa, Mexico, the Caribbean, and Costa Rica to pursue some of the most elusive and deadly animals. Published digitally by Smithsonian Magazine, National Geographic, and a multitude of news and conservation groups, William represented The Citadel at the 2018 SOCON Undergraduate Research Forum.



A Black Racer, one of the south's most common non-venomous snakes.

Wildlife photography has been a part of my life since I received a small film camera from my grandfather when I was five years old. My grandfather, who was born and raised in South Africa, is an avid outdoors man and wildlife photographer who was my main inspiration to pursue the great hobby.

Learning the craft from many wildlife photographers around the country, I have honed my skills using their guidance over the years. I have been blessed by God to have witnessed His glorious creation, which continues to amaze me daily. From the Rocky Mountains to the jungles of Mexico and Central America, I have spent years searching for elusive and rare wildlife to further educate people on the



A False Killer Whale breaks the surface of the Pacific Ocean near Cano Island. False-Killer Whales are much smaller than the iconic Orca.

sheer variety of creatures that inhabit this planet.

Recently, my fiancée and I travelled to the central American country of Costa Rica, which is host to an incredible amount of biodiversity. We observed nearly 200 species of birds, 5 species of snakes, 4 species of monkeys, whales and large arachnids. The majority of the photos that follow are from our trip to Costa Rica. We hiked over 120 miles and spent three weeks in rural areas of the country, spending hours in the jungle and in cloud-covered rainforests. It was an amazing experience to say the least, and I hope that each of you pursue international travel at some point in your lives. It is a life changing experience.



Capuchin Monkeys are the most abundant monkey species in Central America. They are known for stealing various items from unsuspecting travelers.



A view of Costa Rica's Arenal Volcano from the town of La Fortuna. One of several active volcanos in Central America, Arenal's last major eruption was in 2006.



A Red-Legged Honeycreeper in Costa Rica's central valley.
Honeycreepers feed mainly on fruit and small insects.



Talamanca Hummingbirds only live above 2500m ASL, and
reside only in Costa Rica and Panama



A Common Black Hawk eats a hermit crab while the Pacific
Ocean crashes just meters away



A Nine-Banded Armadillo seen at Donnelley WMA, south
of Charleston. Most Armadillos have poor vision and detect
predators based on ground vibrations.



The majestic Rio Celeste in northern Costa Rica. The river is cyan blue due to a high volume of Sulphur from volcanic springs.



One of the deadliest snakes in Central America, the Eyelash Pit-Viper hunts exclusively in the trees



The iconic Red-Eyed Tree Frog, a common resident of lowland rainforests



"The Overnight Spirit" by Kaytlynne McCord

The Traditions of Reformed Theology and the Institution of American Democracy

Aaron Michael Newton



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ABSTRACT

The 21st century has proven itself to be a time of division, revision and questioning concerning the roots of American government as well as that government's efficacy and identity. This is a complex and petulant subject that has the potential to fill volumes. Keeping this in mind, it is the scope of this paper to examine the origins, concepts and leading individuals within the Reformed theology tradition and how this system has influenced the development of American political thought.

Nineteenth century Baptist preacher Charles Spurgeon once expounded that "The old truth that Calvin preached, that Augustine preached, that Paul preached, is the truth that I must preach today or else be false to my conscience and my God. I cannot shape the truth; I know of no such thing as paring off the rough edges of doctrine. John Knox's gospel is my gospel. That which thundered through Scotland must thunder through England again" (Steele, 169). Spurgeon spoke this concerning the belief system of Calvinism or Reformed theology; a system that has had a tremendous influence in intellectual, religious and political mechanisms of Western, and specifically American, civilization. This paper will examine the characteristics of Reformed theology, its propagators, its transmission to the American colonies and the influence it has exerted on political philosophy.

First, what is meant by Reformed theology? This belief system is characterized by emphasis on the supreme sovereignty of God in all facets of the universe, but in particular regarding man's salvation. The defining, and controversial, aspect of reformed theology is the doctrine of unconditional election; election being "that before Creation God selected out of the human race, foreseen as fallen, those whom he would redeem, bring to faith, justify, and glorify in and through Jesus Christ" (Packer, 149). This election by God operates through the overarching concept of divine Providence, which 19th century theologian and president of Princeton Theological Seminary Charles Hodge wrote is "his [God's] most holy, wise, and powerful preserving and governing [of] all his creatures and all their actions. Providence, therefore, includes preservation and government. By preservation is meant that all things out of God owe the continuance of their existence..." (Hodge, 575).

The Reformed conception of the earthly state is exemplified in the Westminster Confession of Faith (1646) which conditions that “God, the supreme Lord and King of all the world, hath ordained civil magistrates, to be, under him, over the people, for his own glory, and the public good; and, to this end, hath armed them with the power of the sword, for the defense and encouragement of them that are good, and for the punishment of evil doers...” (XXIII.1). This document was not the result of spontaneous generation, it was built on the previous one and a half centuries of the Reformation, and its foundations were claimed to extend as far back as Augustine due to his formulation of the doctrines of God’s sovereignty, man’s depravity and election, derived from his understanding of Scripture. Augustine maintained that due to Adam’s fall, human nature has been rendered incapable of perfect obedience to law, whether God’s or man’s (Steele, 9-11). Eleven centuries later, the Augustinian monk Martin Luther stumbled upon Augustine’s realization that “the righteous will live by faith” (Bainton, 47-48) and initiated the Protestant Reformation.

Luther’s aim was not to cause political revolution, but as the scope of the Reformation grew he could not avoid its discussion. Luther’s treatment of earthly politics is heavily derived from Augustine, writing in his “Temporal Authority” that all humanity is divided into the kingdom of God and the kingdom of man (O’Donovan, 586). This division of the world creates the necessity of established law which is instituted for the sake of the lawless (1 Tim. 1:9). It is important to note that Luther did not want a Christian theocracy, and he writes “take heed and first fill the world with Christians before you attempt to rule it in a Christian and evangelical manner” (O’Donovan, 587); this was his primary concern. Additionally, a theocracy cannot be

established since humanity as a whole cannot be expected to adopt Christian virtues in its entirety. Luther extrapolated heavily from the Sermon on the Mount, from which a political message can be drawn for the Christian to conduct himself in love as concerns all affairs political and otherwise; “It is not for himself, but out of love for the neighbor the Christian accepts and upholds the office of the sword” (Bainton, 240). Luther was not an anarchist, writing that “it is permissible to use orderly procedure in demanding and obtaining your rights, but be careful not to have a vindictive heart. Thus it is proper for a judge to punish



Martin Luther visits Dresden⁵

and execute...” (O’Donovan, 600). Due to the fallen state of the world, law is necessary, but its implementation must be handled through the application of an honest heart; “the civil sword out of great mercy must be unmerciful and out of sheer goodness must exercise wrath and severity” (Bainton, 242).

Similarly to Luther, John Calvin is not overtly concerned with political matters, but due to the comprehensive nature of his systematic work *Institutes of the Christian Religion*, he was obliged to deal with the

subjects of law and government from a Christian perspective, noting “It is, however, to be carefully observed, that Christian liberty is in all parts a spiritual matter” (O’Donovan, 667). The drive of Calvin’s political philosophy was to make apparent the church’s task of making the invisible kingdom of God visible (Sproul, 115). Drawing from Luther’s earlier work, Calvin wrote “Finitum non capax infinitum; that the finite cannot grasp the infinite” (Sproul, 37); however the glory of God is engraved on all the works of his creation including the laws of men. Human law, ideally, must be derived from the Bible since from Calvin’s perspective, “the Scriptures are the only records in which God has been pleased to consign his truth to perpetual remembrance” (Sproul, 52). Calvin takes a high view of law as being a derivation of divine covenants writing that “the strongest sinews of government, the law is a dumb magistrate, the magistrate a living law” (O’Donovan, 675), and, he believed that laws must be corporeal and enforced. The liberty from divine wrath that exists for the elect Christian does not warrant freedom from standards, but under this “privilege of liberty” (O’Donovan, 668) there must exist a healthy degree of moderation and prudence in daily life. This freedom allowed for the development of a strong work ethic within the Reformed tradition, which can be exemplified with Calvin’s statement in “Letters of Advice on Usury” that a merchant will increase in wealth through the industrious quality of his work (O’Donovan, 682-683).

Reformed theology came to Great Britain largely through the personality of John Knox, who specifically founded Presbyterianism in Scotland and helped to inspire the Puritan movement within the Church of England. Knox’s political works are characterized by a flagrant criticism of the oppressive nobility in both British kingdoms,

targeting Mary I of England as a then contemporary Jezebel. He wrote that “We see our country set forth for a prey to foreign nations; we hear the blood of our brethren, the members of Christ Jesus, most cruelly, to be shed; and the monstrous empire of a cruel woman we know to be the only occasion of these miseries” (O’Donovan, 687-688). He goes on in his “Appellation” to provoke open hostility towards the Scottish nobility and says everything save a call for open rebellion, writing, “Now, if your king be a man ignorant of God, enemy to his true religion, blinded

“Due to the fallen state of the world, law is necessary, but its implementation must be handled through the application of an honest heart.”

by superstition, and a persecutor of Christ’s members, shall ye be excused if ye with silence pass over his iniquity?” (O’Donovan, 692). This attitude of defiance to man and trust in the Providence of God, when combined with the decentralized (cautiously democratic) church governments of Non-Conformists, Congregationalists and Presbyterians would play instrumental in the formation of the political philosophy that would cradle the American Revolution.

It was the Puritans who carried the Reformed conviction of the efficacy of every common believer to the Americas. Seventeenth century Puritan writer and preacher John Bunyan is foremost remembered for his allegory of the Christian life, *The Pilgrim’s*

Progress, which shows a relatively clear development of Reformed Puritan thought that would be transported to the colonies. Bunyan writes in the closing pages of the story, “This River has been a terror to many, yea, the thoughts of it also have often frightened me; but now methinks I stand easy, my foot is fixed upon that upon which the feet of the Priests that bare the Ark of the Covenant stood, while Israel went over this Jordan. The waters indeed are to the palate bitter, and to the stomach cold; yet thoughts of what I am going to, and of the conduct that waits for me on the other side, doth lie as a glowing coal at my heart” (Bunyan, 289). Essentially, the preservation of faith and the security that comes from Christ grants the Christian freedom from fear and despair in this life, and imparts a hopeful anticipation of union with God as well as a liberty to turn his focus to the betterment of temporal life. It was too this end that the Puritans left England with a bold pledge to seek out a shelter in the New World where they could foster their convictions and forge as close to an ideal society, as they perceived it, as possible on this earthly plain.

The Puritan Separatist founders of Plymouth Colony signed the Mayflower Compact of 1620, instituting the first government by popular consent in the American colonies. The document makes cursory reference to God that fits with customs of the time, and it is worth referencing the purpose and instrument of the compact: “for the glory of God, and advancement of the Christian faith...do by these presents solemnly and mutually, in the presence of God, and one of another, covenant and combine our selves together into a civil body politic, for our better ordering and preservation and furtherance of the ends aforesaid...”. Keeping in mind the philosophy of God’s provision and providence for his people [the church] the settlers of

Plymouth would have seen themselves as a new “children of Israel” escaping from the bondages of Egypt, being guided by the hand of a God who has orchestrated all things from time immemorial. This document, for the Puritans especially, represents the opportunity for the establishment of a just society where man can live by the authority of God. Greater significance still, is that the Mayflower Compact brought to fruition the words of past thinkers; the physical materialization of what before may have been only philosophy.

Five generations later, that society produced the Reformed Puritan minister Jonathan Edwards, a man described as being among the greatest of American thinkers and philosophers. He wielded a great deal of influence on the development of colonial thought during the eighteenth century Great Awakenings on the eve of our Revolution, one such example being his sermon “Sinners in the Hands of an Angry God” delivered in 1741. Edwards speaks repeatedly of God’s power in this sermon, citing that “there is no fortress that is any defense from the power of God “ (Edwards, 17), and “the sword of divine justice is every moment brandished over their heads, and it is nothing but the hand of all-powerful mercy, and God’s sovereign will, that holds it back” (Edwards, 19). Edwards is very concerned for God’s requirement of justice in the world, [spiritually, a judgement escapable through Christ’s grace] and politically, his words can be taken as a need for justice in society. Historical Christian thinkers would agree with near unanimity that man can be the vessel of God’s justice, a justice consisting of repercussion for the breaking of law and covenant: “The bow of God’s wrath is bent; the arrow is made ready on the string; and justice bends the arrow at your heart, and strains the bow” (Edwards, 35). Edwards, maternal grandfather of Vice President Aaron Burr, believed the pursuit of

politics to be worthless, though he comments that “The wrath of kings is very much dreaded, especially that of absolute monarchs, who have the possessions and lives of their subjects wholly in their power” (Edwards, 39-40). This sentence, in context, serves as a comparison with the supreme authority of God, yet it would certainly be applicable to the American perception of the British monarchy in the following generation.

Thomas Jefferson, while actually a critic of Calvinism and most orthodox tenets of Christianity, lived in a society fresh delivered out of the religious revivals of the 1730s and 1740s; a society saturated with Puritan

“However, it was a hope of those generations that the ideals of Christian virtue and justice might be imbued within the form of an ordered society.”

thought which dominated higher American society and universities of the era. Upon consideration of earlier writers and thinkers, several lines from “The Declaration of Independence” reflect an intellectual descent from tenets of historical Christian philosophy that permeated the colonial American world. The first to note is the document’s purpose, “to assume among the powers of the earth, the separate and equal station to which the Laws of Nature and of Nature’s God entitle them”; if man, preserved by the good will of God, and the laws of man derive from God, then it is a right of men to exercise his temporal liberty which includes the correction

of injustice and the institution of governing systems more aligned with that of absolute truth (e.g. consent of the people). This then flows into the well-known statement “that whenever any Form of Government becomes destructive of these ends, it is the Right of the People to alter or to abolish it, and to institute new Government”; a belief that is strongly reminiscent of Knox’s conviction two centuries earlier that for the sake of the preservation of justice and the establishment of absolute truth, a corrupt government that does not heed the veracity of God requires dissolution. Jefferson’s closing remark is the most crucial of all before here mentioned, an affirmation that the Declaration’s signers do so “with a firm reliance on the protection of divine Providence”; the signers (figuratively if not personally) had resigned their fates, the fates of their families and the very fate of “Christian” democracy to the hands of God.

It was never the intent of conventional reformers that a theocracy would or could ever be built, and to do so would be counterproductive to the aims of the Reformation. However, it was a hope of those generations that the ideals of Christian virtue and justice might be imbued within the form of an ordered society. Five hundred years ago, Martin Luther, drawing from the traditions of St. Augustine, launched a spiritual revolution, a revolution later carried on by Calvin and Knox defined by the idea of God’s special interest in the world and in a people. These feelings of election, of a separateness from the carnal world, inspired the early American colonists to set forth a system of just government fueled by a lasting trust in the security and beneficence of God for the present and the future. This can still be seen with the comparatively recent adoption of the motto “In God We Trust” four centuries after Calvin completed his Institutes. The

tenets of Reformed theology are deeply engrained in the basic principles of American political philosophy, demonstrating the long arm of personal conviction and the influence that can be enjoyed by a single idea centuries after death and affliction have destroyed any physical remnants of a man from the earth.

WORKS CITED:

1. Bainton, R. H. (2017). *Here I Stand: A Life of Martin Luther*. Peabody, MA: Hendrickson.
2. Bunyan, J. (2003). *The Pilgrim's Progress*. Oxford, UK: Oxford University Press.
3. Edwards, J. (1997). *Sinners in the Hands of an Angry God*. New Kensington, PA: Whitaker House.
4. Hodge, C. (2016). *Systematic Theology* (Vol. 1). Peabody, MA: Hendrickson.
5. "Martin Luther visits Dresden" by chop1n is licensed under CC by-nc 2.0
6. O'Donovan, J. L. (1999). *From Irenaeus to Grotius: A Sourcebook in Christian Political Thought* (O. O'Donovan, Ed.). Grand Rapids, MI: William B. Eerdmans Publishing Company.
7. Packer, J. I. (1993). *Concise Theology: A Guide to Historic Christian Beliefs*. Carol Stream, IL: Tyndale House.
8. Sproul, R. C. (2016). *What is Reformed Theology?* Grand Rapids, MI: Baker Publishing Group.
9. Steele, D. N., Thomas, C. C., & Quinn, S. L. (2004). *The Five Points of Calvinism* (2nd ed.). Phillipsburg, NJ: P&R Publishing Company.
10. *The Westminster Confession of Faith*. (2015). East Peoria, IL: Versa Press.

Fetal Alcohol Spectrum Disorder

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ABSTRACT

Alcohol consumption during pregnancy leads to fetal alcohol spectrum disorder (FASD) which is where alcohol adversely impacts the development of the fetus. FASD is broken up into fetal alcohol syndrome (FAS), partial fetal alcohol syndrome (PFAS), and alcohol related neuro-development disorder based on the amount of alcohol the fetus' is exposed to. There are numerous negative defects associated with this. There is currently no treatment for FASD, however family support makes a profound impact on neuro-behavioral impairments. Furthermore, FASD can be prevented if women who are pregnant, or are trying to become pregnant, restrain from alcohol intake.

Environmental impacts on development has been a major area of study for the past few decades for developmental biologists. Some of the well-known teratogens that have caused adverse effects on the developing embryo have caused major deformity outbreaks, like Thalidomide. However, the leading cause of preventable cognitive impairment in the United States is alcohol, which can lead to fetal alcohol spectrum disorder (FASD).¹⁰ FASD is where the mother is exposed to some quantity of alcohol during pregnancy. There are three major diagnoses of FASD: fetal alcohol syndrome (FAS), partial fetal alcohol syndrome (PFAS) and alcohol related neuro-development disorders. All of which are based on when the embryo is exposed to alcohol and the quantity of alcohol present.

FAS is the most severe case of FASD, whereas PFAS has a lower severity and alcohol related neuro-development disorder has the lowest severity in the spectrum. In any case of FASD the severity of the developmental impacts is based on how much alcohol the embryo is exposed to and at what point in development the alcohol is introduced. The quantity of alcohol is typically the factor that distinguishes which level of severity the offspring would have. However, the timing on when the alcohol is administered to the body is crucial to the impacts it has on the embryo. In development there are critical points where certain organ systems are developed at certain points in the embryo's development. If alcohol is present early in the pregnancy more organ systems will be affected, whereas if alcohol is present later in pregnancy it would have a little or no effect on the organ systems that have already been developed. Knowing the time frame in which alcohol was introduced can predict which organ systems could be affected based on the critical points. In a study pertaining to alcohol's effect on the

heart of zebrafish the researchers exposed the zebrafish embryos to alcohol from 10 to 30 hours post fertilization to mitigate the effect of the alcohol on development before the heart is formed.⁹

In normal development, the placenta is formed to nourish and support the embryo during development. The placenta has a maternal part called the endometrium (inner layer of the uterus) and the fetal part called the chorion (shown in Figure 1). Once the embryo is implanted into the endometrium

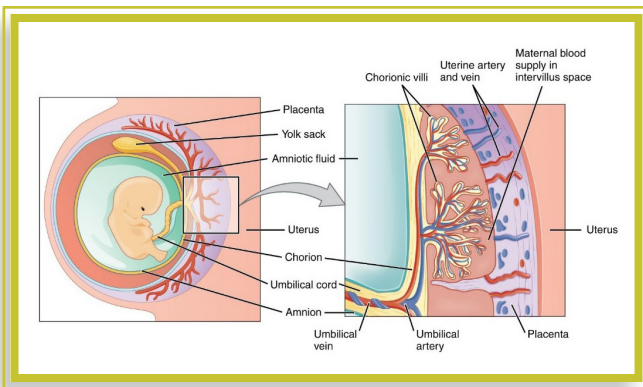


Figure 1. Shows the parts of the placenta, along with the placental barrier which keeps the fetal and maternal blood separated¹²

the chorion then begins to form around day nine. The major function of the placenta is to transfer nutrients and oxygen to the fetus and take out waste and carbon dioxide via the umbilical cord. Since the fetus cannot breathe oxygen or ingest food, the placenta is the main way the fetus can get oxygen into their blood and nourishment for their body to develop via the blood from the mother. The blood from the mother brings nutrients and oxygen to the placenta and the oxygen and nutrients pass through the placental barrier. In *Developmental Biology* by Scott Gilbert says, "The maternal blood and fetal blood usually do not mix".⁷ This quote explains how the mixture of blood from mother to fetus and vice versa is normally prevented.

When the mother drinks alcohol her blood alcohol concentration (BAC) goes up which is detrimental to the developing fetus. As the blood comes into contact with the placenta, oxygen and nutrients are transferred through the placental barrier. However since alcohol is a small polar molecule it is able to pass through the placental barrier. This means that the more alcohol ingested by the mother, the higher her BAC will be, and the higher it would be in the fetus also. In an adult the liver helps detoxify the blood and rid the body of the alcohol. However, in a fetal blood circulation the blood is diverted from the liver since it is not fully functional yet (shown in Figure 2). Which means the fetus has no

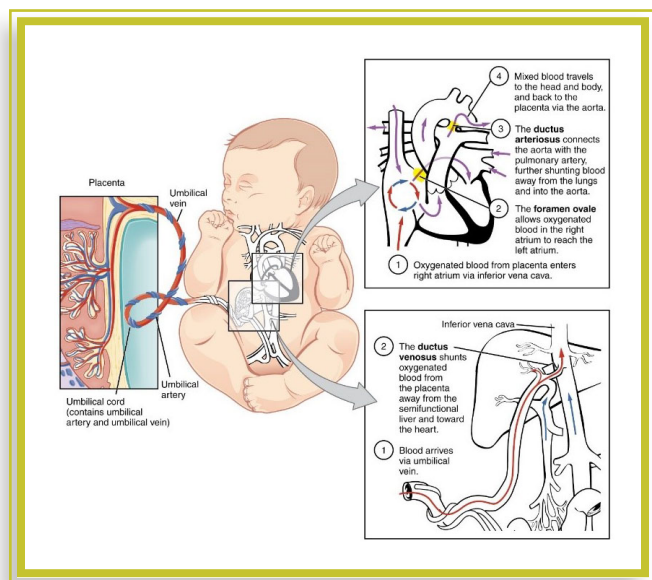


Figure 2. Shows the fetal circulatory system. Note that blood is diverted away from the liver while the fetus is developing⁶

way of detoxifying its own blood, which causes alcohol to remain in fetal blood longer than it does in the adult blood. The only way for alcohol to exit the fetal bloodstream is to pass back through the placental barrier back into the mother's bloodstream. A large factor of BAC is the body mass of the individual, where one glass of wine might have little to no effect on adults it could have adverse effects on the

fetus. In Developmental Biology The author states, "Alcohol can cause permanent damage to a fetus at a time before the women even realize they are pregnant".⁷ Since the body mass of the fetus is a small fraction of that of an adult and the fetus is still undergoing major developmental changes alcohol's effect can be catastrophic to the fetus.

"Since the body mass of the fetus is a small fraction of that of an adult and the fetus is still undergoing major developmental changes alcohol's effect can be catastrophic to the fetus."

Alcohol consumption during pregnancy has been readily increasing in the past few years. In 2012 there were 7.6% of women that consumed alcohol while pregnant and it rose to 10.2% in 2015.³ In the United States alone it is estimated that 24 to 48 per 1,000 children are born with FASD.⁸ However, since alcohol is a teratogen the frequencies vary dependent on how much alcohol pregnant women intake each year. The main mechanism on how alcohol affects development is still not fully understood. However the symptoms of FASD vary from minor facial deformities to having a major brain deformity causing the brain to be significantly smaller.²

FASD is distinguished into three main diagnoses (FAS, PFAS, and alcohol related neuro-development disorder) based on how much of development is adversely affected. There are five main abnormalities that are looked for when a patient is diagnosed with

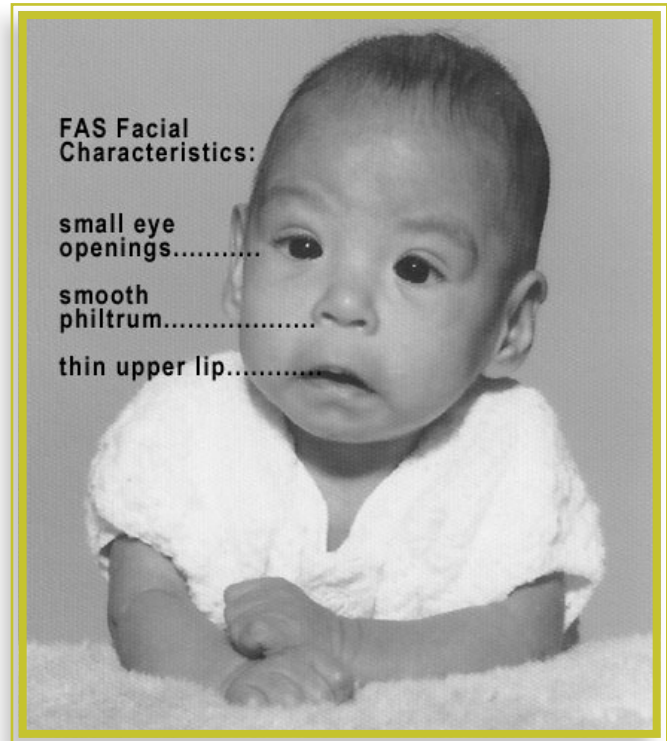


Figure 3. Shows some facial abnormalities that are common with Fetal Alcohol Syndrome⁵

FASD. Which include documented alcohol exposure, facial dysmorphology (shown in Figure 3), growth deficiency, central nervous system (CNS) dysfunction and neuro-behavioral impairments. For a patient to have FAS all symptoms must be observed with or without the exception of the documented alcohol exposure and is the most severe form of FASD. PFAS is a combination of at least three of the five symptoms, with or without documented alcohol exposure. Alcohol related neuro-development disorder is diagnosed when there are only neuro-behavioral impairments are present with documented alcohol exposure and is the least severe of the three diagnoses of FASD.

Within the main five factors that determine whether an individual has FASD, there are many other symptoms that are related to one of the main five. Prenatal alcohol exposure is defined as a pattern of

excessive intake characterized by substantial, regular intake or heavy episodic drinking or drinking reported by the mother around the time of a positive pregnancy test.^{3, 13} Facial dysmorphology may include a thin upper lip, smaller eyes, small midface and short nose. Growth deficiency includes a smaller weight and a shorter body length. CNS dysfunction includes a smaller brain or head circumference and increased ventral neural crest cell apoptosis.⁴ Neuro-behavioral impairments include individuals having difficulties in learning, impulse control, memory, school performance or judgement.¹³

In addition to the five main factors that determine if an individual has FASD, there are various of other effects that have been discovered through research. Heart development and function also has adverse effects due to maternal alcohol consumption. In an experiment using zebrafish, scientist observed that alcohol significantly decreased heart rate and that higher concentration of alcohol prevented the heart from folding properly. Also, this experiment showed that fetus' exposed to alcohol caused the part of the aorta to be destroyed leading to edema causing the zebrafish to have limited mobility.⁹ In another study, alcohol was shown to cause iron deficiency by diverting iron from red blood cells and the brain and directing the iron to the liver.⁸

Even though FASD has had numerous studies to help distinguish some of the symptoms and possible diagnosis, there is still much to research about FASD and the impacts on development. The main point of research for FASD is to better understand the mechanism on how alcohol affects various organ systems throughout the fetus' body. With a better understanding of the mechanism it will be more realistic to discover a treatment to help mitigate the effects of alcohol on fetal

development. Also, research on diagnoses of FASD should be done to prevent individuals from being misdiagnosed or not diagnosed at all. The diagnosis process currently is based on having distinguishable symptoms, however most individuals that have alcohol related neuro-development disorder are missed because the symptoms are not as noticeable. This could cause major difficulties for the individuals to be able to get the help they need. On average a child with FAS has medical expenses that are nine times higher than that of a child without FAS.³ This shows

“On average a child with FAS has medical expenses that are nine times higher than that of a child without FAS.”

that proper diagnosis is crucial in enabling the individuals with FASD to get the proper care. Another area of future research is determining if there is a safe amount of alcohol that can be ingested by the mother, without causing adverse effects. It is already known that the lower the concentration of alcohol, the less of an impact it will have on development. In the zebrafish study looking at heart morphology the low dosage (1% alcohol) of alcohol that was administered was able to recover the normal morphology of the heart overtime. Whereas the high dosage (2% alcohol) morphology did not recover.⁹ This shows that there may be a certain limit where alcohol exposure doesn't have any adverse effect to development.

In any case of FASD the amount of alcohol that the mother intakes is directly proportional to the severity of the syndrome. With any severity of FASD there is no known

medication to treat FASD.¹⁵ However there have been studies where iron supplements may have an impact in mitigating some effects of FASD. When alcohol is present iron is diverted from the brain, however when iron supplements were taken by mice it mitigated alcohol's effect on iron and improved iron content in the brain.⁸ When individuals have FASD there are a multitude of doctors and specialists that care for them to the best of their abilities. Most of the five factors that diagnoses an individual with FASD have no treatment, however the potency neuro-behavioral impairments can be alleviated by the care of their family. In the book Fetal Alcohol Syndrome, there was a case study about two young boys who were neglected by their mother, which caused them to be unresponsive and quiet. However, after a year of being in the foster home both made improvements to their neuro-behavioral impairments to such an extent that both could attend school and could speak.¹³ This shows that support from family can help mitigate the psychological effects of alcohol on the individual with FASD. Ultimately the best way to prevent FASD is to further educate people about FASD and the adverse effects alcohol has on the developing fetus.

“Ultimately the best way to prevent FASD is to further educate people about FASD and the adverse effects alcohol has on the developing fetus.”

As the percentage of women who consume alcohol during pregnancy increases, so does the diagnosis of FASD. FASD is a teratogenic

defect that plays a major impact in altering development of a fetus in the womb. Some of these symptoms are mild and only cause facial deformities (shown in Figure 3) like a thin upper lip or a short nose. However, some symptoms may include heart deformities or brain abnormalities. The symptoms are widespread and can affect most developing organ systems within the fetus. This shows why more research must be done to get the information about FASD to people across the world. FASD is a defect that can be prevented if women abstain from drinking alcohol while pregnant or trying to get pregnant. The main goal is to get the information about FASD out into the schools to ultimately mitigate the presence of FASD in people worldwide.

REFERENCES

- 1.) Amos-Kroohs, R. M., Nelson, D. W., Hacker, T. A., Yen, C. E., & Smith, S. M. (2018). Does prenatal alcohol exposure cause a metabolic syndrome? (Non-)evidence from a mouse model of fetal alcohol spectrum disorder. Plos One, 13(6). doi:10.1371/journal.pone.0199213
- 2.) Bukiya, A. N., & Dopico, A. M. (2018). Fetal Cerebral Circulation as Target of Maternal Alcohol Consumption. Alcoholism: Clinical and Experimental Research, 42(6), 1006-1018. doi:10.1111/acer.13755
- 3.) Denny, L., Coles, S., & Blitz, R. (2017). Fetal Alcohol Syndrome and Fetal Alcohol Spectrum Disorders. American Family Physician, 515-521
- 4.) Eason, J., Williams, A. L., Chawla, B., Apsey, C., & Bohnsack, B. L. (2017). Differences in neural crest sensitivity to ethanol account for the infrequency of anterior segment defects in the eye compared with craniofacial anomalies in a zebrafish model of fetal alcohol syndrome. Birth Defects Research, 109(15), 1212-1227. doi:10.1002/bdr2.1069
- 5.) Fetal Alcohol Syndrome. (n.d.).
- 6.) Fetal Circulatory System. (n.d.).
- 7.) Gilbert, S. F., & Barresi, M. J. (2018). Developmental biology (Tenth ed.). Sunderland, MA: Sinauer Associates.

- 8.) Huebner, S. M., Helfrich, K. K., Saini, N., Blohowiak, S. E., Cheng, A. A., Kling, P. J., & Smith, S. M. (2018). Dietary Iron Fortification Normalizes Fetal Hematology, Hcpidin, and Iron Distribution in a Rat Model of Prenatal Alcohol Exposure. *Alcoholism: Clinical and Experimental Research*, 42(6), 1022-1033. doi:10.1111/acer.13754
- 9.) Li, X., Gao, A., Wang, Y., Chen, M., Peng, J., Yan, H., . . . Chen, D. (2016). Alcohol exposure leads to unrecoverable cardiovascular defects along with edema and motor function changes in developing zebrafish larvae. *Biology Open*, 5(8), 1128-1133. doi:10.1242/bio.019497
- Denny, L., Coles, S., & Blitz, R. (2017). Fetal Alcohol Syndrome and Fetal Alcohol Spectrum Disorders. *American Family Physician*, 515-521.
- 10.) Montgomery, K. S., Bancroft, E. A., Fincher, A. S., Migut, E. A., Provasek, V., Murchison, D., & Dubois, D. W. (2018). Effects of ethanol and varenicline on female Sprague-Dawley rats in a third trimester model of fetal alcohol syndrome. *Alcohol*, 71, 75-87. doi:10.1016/j.alcohol.2018.02.006
- 11.) Muralidharan, P., Sarmah, S., & Marrs, J. A. (2018). Retinal Wnt signaling defect in a zebrafish fetal alcohol spectrum disorder model. *Plos One*, 13(8). doi:10.1371/journal.pone.0201659
- 12.) Placenta. (n.d.).
- 13.) Stratton, K., Howe, C., & Battaglia, F. (1996). Fetal Alcohol Syndrome. *National Academy of Sciences*
- 14.) Suttie, M., Wozniak, J. R., Parnell, S. E., Wetherill, L., Mattson, S. N., Sowell, E. R., . . . Hammond, P. (2018). Combined Face-Brain Morphology and Associated Neurocognitive Correlates in Fetal Alcohol Spectrum Disorders. *Alcoholism: Clinical and Experimental Research*, 42(9), 1769-1782. doi:10.1111/acer.13820
- 15.) Wilhoit, L. F., Scott, D. A., & Simecka, B. A. (2017). Fetal Alcohol Spectrum Disorders: Characteristics, Complications, and Treatment. *Community Mental Health Journal*, 53(6), 711-718. doi:10.1007/s10597-017-0104-0

The Conundrum Called Capital Punishment

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ABSTRACT

The United States of America, said to be founded on Christian principles, has a long and contested history regarding the issue of capital punishment. The Old Testament states that the penalty should be "life for life, eye for eye," but recent opinions suggest that this system may be putting innocent defendants to death. This essay explores popular arguments for and against the death penalty and other modern implications of capital punishment in America.

Throughout the history of the world, the harshest crimes have always come with an expectation for the harshest sentences. The Hebrew Bible states "But if there is any further injury, then you shall appoint as a penalty life for life, eye for eye." If not to punish, at least to keep that same person from hurting others and to create closure for the victims family. An important question to ask though is what if the jury and the courts got it wrong. What if there was a racist prosecutor who hid crucial evidence for the sole purpose of putting a black or Hispanic man to death. What if it is cheaper to keep the human alive in jail, than it is to put them to death. What if the Hebrew Bible is wrong, and the sacredness of human life is more important than the will of revenge. These are questions that for thousands of years, have enveloped the minds of layman and scholars alike, and will fill the lines of these sheets as well. It is important to note that while this paper is factually sound, the purpose is not entirely to inform, but also to show the value of forgoing capital punishment from our laws.

HISTORY OF CAPITAL PUNISHMENT IN AMERICA

Capital punishment in the United States has a long and contested history. While there has always been a death penalty, it has been challenged many times, most notably, the period between 1967 and 1977 when no executions took place. There were no executions during this period due to *Furman v. Georgia*, the 1972 Supreme Court case in which the court ruled on a 5-4 split that the death penalty violated the constitution (Simon & Dagny, 2002). In the per curiam, which translates to "by the court," the justices stipulated that the use of the death penalty was struck down because of its violations of the 8th amendment which states that cruel

and unusual punishment shall not inflicted. Of the 5 justices who voted in the majority, none of them could agree completely on the rationale for the decision, and therefore they all wrote separate opinions on the decision. Regardless, three of them wrote very similar opinions. Justices Potter Stewart, Byron White, and William Douglas all expressed concerns regarding the arbitrariness by which the sentences are given out, specifically citing racial bias against black defendants. This vote is considered the weakness of this decision, because in their opinions, all three also stated that this deficiency was a current one, and could be fixed in due time. Two other justices, Brennan and Marshall, came to the decision that the death penalty as “in itself, cruel and unusual punishment,” and incompatible with the evolving standard of decency in a modern society (Simon & Dagny, 2002). According to PBS, executions were completely stopped during this period (PBS, 1997).

In the 1976 Supreme Court case *Gregg V. Georgia*, the Supreme court found that Georgia’s new execution laws did not infringe on any 8th Amendment rights, and executions were the law of the land yet again, which is what led to the increase in executions in the early 1980’s (Simon & Dagny, 2002).

ARGUMENTS IN FAVOR AND AGAINST OF THE DEATH PENALTY

Retentionists of the death penalty will generally argue the same few things in favor of keeping capital punishment legal. In the most recent Gallup poll regarding the issue, the biggest reasons for favoring capital punishment include: “An eye for an eye”, “Save taxpayers money”, “they deserve it”, “Keep them from repeating it”, and as a “deterrent for potential crimes.”

The argument of “an eye for an eye” is by far the most used argument. The basic tenets

of the argument lie in the Old Testament in which the argument that an eye for an eye, or tooth for tooth is the proper punishment fitting the crime. The question asked is, if the murderer was willing to take a life, why shouldn’t his life go as well? This argument has lost traction since 1991, dropping 15% in 20 years, it is important to note that the majority of this change happened in the short period from 2001-2003, with very little fluctuation since. The sudden drop in that two year period could be attributed to the consecutive decrease in executions in 2000 and 2001 (Economist, 2002). It could also be due to the five death row inmates who were set free in 2001, with Justice Sandra Day O’Connor stating the statistics suggest “the system may well be allowing some innocent defendants to be executed” (Economist, 2002).

Supporters of capital punishment also state that it will save taxpayer’s money, and is cheaper for the state. In truth, this is a grossly misinterpreted piece of evidence, one that is overused, and blatantly incorrect. An independent study of the costs of seeking and imposing the death penalty in Oklahoma, prepared for the Oklahoma Death Penalty Review Commission, found that seeking the death penalty in Oklahoma “incurs significantly more time, effort, and costs on average, as compared to when the death penalty is not sought in first degree murder cases” (DPIC, 2017). The report, prepared by two Seattle University criminal justice professors, came to the conclusion that Oklahoma capital punishment cases cost, on average, 3.2 times more than non-capital cases (DPIC, 2017). It is a disturbing thing to see that many Americans have based their opinions of capital punishment on a basis that is untrue. By understanding this, it completely skews the data found on support for the death penalty,

and puts into doubt the true understanding of capital punishment in this country.

Another argument for the death penalty states by enforcing capital punishment, it keeps these criminals from hurting anyone else. This argument is based in the belief that a murderer who is dead cannot murder anyone else. While this is an understandable argument, it is again one that is short in facts. The reality of death row is a very bleak life, which includes almost no contact with any other human being. A constant state

“The question asked is, if the murderer was willing to take a life, why shouldn’t his life go as well?”

of solitary confinement leads to a relatively impossible chance of that inmate hurting anyone else. When the prisoner is not allowed to talk or interact with any other prisoners, let alone the guards, it is inconceivable to see him or her committing another crime of capital proportions.

The last major reason is that the death penalty acts as a deterrent for any future capital crimes. This basis is rooted in varying studies such as Schuessler’s 1952 “time series analysis of execution and homicide data,” in which he found “a slight tendency for the homicide rate to diminish as the probability of execution increases” (Berns, 1979). Also, Isaac Ehrlich, a University of Chicago professor, concluded that “on the average the tradeoff between the execution of an offender and the lives of the potential victims it might have saved was of the order of magnitude of 1 for 8 for the period of 1933-1967” (Berns, 1979). These older studies

though run contrary to more recent beliefs. In the year 2000, then U.S. Attorney General Janet Reno stated, “I have inquired for most of my adult life about studies that might show the death penalty is a deterrent. And I have not seen any research that would substantiate that point” (Simon & Dagny, 2002). This falls right into the period from 2001-2003, where public opinion of the death penalty drastically decreased due to multiple stays of execution, and Justice O’Connor’s observation regarding innocent casualties. The deterrent argument falls into a further hole when examining Roger Hood’s 1996 book, *The Death Penalty: A Worldwide Perspective*, in which he concluded that “Research has failed to provide scientific proof that executions have a greater deterrent effect than life imprisonment and such proof is unlikely to be forthcoming. The evidence as a whole still gives no positive support to the deterrent hypothesis” (Hood, 2002).

Many of the arguments against the death penalty are responses to the points brought up by the death penalty retentionist, the most notable of those being the cost difference between an execution and life in prison, as well as lack of a proven deterrence. Other considerable factors include the danger of executing innocent people due to lack of evidence and racial discrimination, as well as the sacredness of human life.

Since 1973, 161 people who were on death row have been exonerated of their crimes and set free. The obvious worry is what if those 161 people had not forced it upon their counsel to keep digging, or what if they did not have sufficient counsel at all. Of those exonerated, 84, or 52% of those who were exonerated were black, pointing to a greater amount of incorrect verdicts handed down to African Americans in this country. The simple fact is there could be more; men and women who have already been executed who were

wrongly accused, and wrongly convicted of their crimes, sentenced to die for something they didn't do. The question that must be asked is whether or not it is sound policy to kill human beings, when up to 4% of those you kill, could be innocent human beings.

Lastly, is the argument that by partaking in capital punishment, we are lowering our moral levels, and essentially stooping down to the level of other murderers. As Justices William Brennan and Thurgood Marshall stated, "[capital punishment is] incompatible with the evolving standard of decency in a modern society" (Simon & Dagny, 2002). The belief is, that the sacredness of human life is just that, sacred. It is not ours to decide who lives and who dies.

CONCLUSION

To conclude, questions of life and death are as important a question as any. Through extensive research and preparation, it is easier to see a valid argument in support of

“Other considerable factors include the danger of executing innocent people due to lack of evidence and racial discrimination, as well as the sacredness of human life.”

the abolition of the death penalty than it is to see a fair argument in favor of it. This is solely based on public perception and ideas, and not on the constitutionality of the law.

When you consider the frailty of arguments such as protection of others and

revenge, it becomes ever more clear the strength of an argument based on human life and continuous human error. When over 150 innocent people have sat on death row waiting for death, only to finally be considered innocent, you realize the frailties of human error, and the catastrophic effects it could have on life. When you realize that it is three times cheaper to keep a person alive, than it is to end his life, you take less heed of arguments pertaining to burden of the state. When you see the amount of citizens who are misinformed on such topics as cost, and deterrence, you worry less about the 55% approval rating that capital punishment has, and worry more about how to educate those people.

Capital punishment, although it has its framework embedded in the law, and is protected so far by the constitution, must be constantly evaluated and observed to ensure that the appropriate punishments are being handed out and administered, to allow the United States to keep a moral high ground that we have held for so long, and to remain a country of compassionate human beings and not savages.

BIBLIOGRAPHY

Retrieved from <https://www.pbs.org/wgbh/pages/frontline/shows/execution/readings/history.html>

Retrieved from <https://www.economist.com/node/923004>

Berns, W. (1979). For capital punishment: crime and the morality of the death penalty. Basic Books.

Costs of the Death Penalty. Retrieved from <https://deathpenaltyinfo.org/costs-death-penalty>

Gallup, Inc. Death Penalty. Retrieved from <http://news.gallup.com/poll/1606/death-penalty.aspx>

Haines, H. H. (1999). Against capital punishment: the anti-death penalty movement in America, 1972-1994. Oxford University Press.

Hood, R. G. (2002). *The death penalty: a worldwide perspective*. Oxford University Press.

Joyce, J. A. (1961). *Capital punishment, a world view*. T Nelson & sons.

Laurence, J. (1971). *A history of capital punishment, with special reference to capital punishment in Great Britain*. Kennikat Press.

Simon, R. J., & Blaskovich, D. A. (2002). *A comparative analysis of capital punishment: statutes, policies, frequencies, and public attitudes the world over*. Lexington.



"Recognition" by William Rasberry.

