Dear Readers,

As proud members of the Sabiduría team, it is our immense honor and privilege as your editors to spotlight the academic prowess students at the Palm Beach State Honors College possess. Individual authors from our diverse institution humbly bestowed their remarkable treatise for criticism and feedback, solely in the name of education. Upon completing a diligent reviewing and editing process, only a select few were selected. Those among the chosen not only positively represent Sabiduría, but they exemplify it as well. We sincerely applaud the following authors for their generosity, tenacity, and humility.

With that being said, congratulations to this semester’s selected authors: Rosy Ayala, Christy LaFlamme, Joseph Culbreath, Kiona Kumpulainen, and Thalles de Oliveira Caiado.

We also wanted to extend our gratitude to the peer-reviewers for their generous work. Our gratitude is also extended to Marcella Montesinos, for her dedication and support, and without whom none of this would be possible.

Sincerely,

Brandon Merino, Editor
Gina Vallarella, Editor
A Seat at the Table Set by Women: An Outlook on Female Matters

Rosy Ayala

Long ago, dating as far back as the 16th century, it would not have been frowned upon to silence and order women as one pleased to do so; that is, if you were a male. Today, if one barks orders at a woman, we’d assume the very least that she’s working in customer service. One would also assume that the woman is getting paid fairly in all aspects of due compensation. Unfortunately, we’re probably assuming incorrectly all across the board. See, the underlying issues are that it’s the 21st century, and women are still dealing with all types of unfair treatment day in and day out. These antiquated ideologies that woman are ‘inferior’ and only here to serve has got to come to a close. Women, contrary to popular belief, are far more than given the credit they deserve. Women are above discrimination, the pay gap, and above undeserved educational barriers faced today.

Women and men alike have created monumental movements, been a part of protests, and continue to progress for equal gender rights. Yet no movements propelled by current social media platforms have withstood the test of time such as the progression of females all across the world in which case is known as the ‘feminism movement.’ Men and women who come together in an ongoing battle against discriminatory treatment that deem women inferior are commonly referred to as feminists. What exactly is feminism? According to Owen M. Fiss, Sterling Professor of Law, Yale University, and former Law Clerk to Justice Thurgood Marshall, feminism is “the belief and ideas that belong to the broad social movement to achieve greater equality for women.”

Although the progression of women may feel stagnant or slow-moving to the instant-gratification-craving millennials, women have certainly come a long way in the past century. It is astonishing the amount of discrimination women face, however, as though racial discrimination was not overwhelming enough. Gender plays a significant, if not, sole role in biased treatment against women. Per the Pew Research Center, a fact bank based in Washington, DC, states that one in ten women are faced with discrimination on the job based on their gender alone. According to a new survey analysis by the PRC, “[women] report a broad array of personal experiences, ranging from earning less than male counterparts for doing the same job to being passed over for important assignments.” Overlooking female colleagues simply on the basis of gender, is an economic blunder if not outright injustice to not only companies who participate in biased treatment, but in unjust act to the progression of society as a whole. Discrimination is heavily attributed to employer
perception of intelligence and ability of the worker. Women aren’t only discriminated against solely in the workplace, but also in their communities.

In fact, the European Union Fundamental Rights Agency, Director Morten Kjairum, states that “The rights of women have long been recognized. But in practice these rights are often violated.” He is right, considering the hurdles migrant women, women with disabilities, and the violence women face on a basis of gender that constantly and consistently violates women’s rights. For example, there have been cases in which women with mental disabilities have been denied rights as personal as reproductive rights.

In some cases, medical specialists do not disclose information to the patient, but instead their care-givers. On a shocking account reported by the EU, “there is evidence of women with intellectual disabilities and women with mental health problems as being victims of forced sterilization in some EU Member States.” The FRA also describes migrant women as making up a large percentage of domestic work. These women often face a considerable amount of discrimination and “are over-represented in poorly regulated and poorly paid sectors of employment.” Since domestic workers are mostly women, they are often vulnerable to specific forms of gender-based violence and racial/gender discrimination. “In addition,” states the FRA, “their irregular migration status means they are often not entitled to basic rights under national law such as healthcare.”

Discriminating against women has not only fared against the economic growth of society but the growth of a nation as a whole. Significant research has proven that as developing countries focus on women and resist pushing them to the back of their minds as “lesser individuals,” they gain a robust and self-sustaining economy (Wolfe). Isobel Coleman, a Senior Fellow on U.S. Foreign Policy at the Council on Foreign Relations states that women are a critical factor to the economic advancement of a country. The UNWomen.org reports in Facts and Figures that “a study using data from 219 countries from 1970 to 2009 found that, for every one additional year of education for women of reproductive age, child mortality decreased by 9.5 per cent.”

To continue, although for the last fifty years women’s participation in the workforce and economy has increased immensely, the brave women that have risked their jobs to challenge equal employment opportunities and challenge pay equity have either had to search for new jobs altogether, or face great amounts of backlash rather than support. The National Women’s Law Center for “Expanding the Possibilities” reports that “Women in the U.S. who work full time, year round are paid only 80 cents for every dollar paid to men — and for women of color, the wage gap is even larger.” Women’s efforts for equal pay has not gone unseen nor unheard, considering that April 10th has become
recognized as “Equal Pay Day,” prompting a handful of states to move Equal Pay Legislations (Nwlc.org).

On the cover of the National Center for Education Statistic’s journal *Trends in Educational Equity of Girls and Women* reads “No person shall, on the basis of sex, be denied an education.” This quote should be a cardinal law inscribed into every institution in every land across the sea, if not done so already. Unfortunately, this is not the case, especially for women from lesser-developed countries. The economic advancement in the workforce of a country most certainly does sway in tandem with the education of their people. One hundred and thirty million girls are astonishingly denied the right to education due to low income, arranged marriages, or early pregnancies. Fifteen million are expected to never enroll at all. The NCES journal reports the positive attribution with postsecondary education attainment and the annual median earnings. In other words, it is well known that with a better education, both sexes earn higher wages.

T. Paul Schultz, the alias for Malcolm K. Brachman, Professor of Economics at Yale University, who received his BA from Swarthmore College in 1961 and a PhD from MIT in 1966 states that “women with an educational background beyond primary schooling are more likely to work wage jobs and... [improve their quality of living] than those with only a primary background.” The NCES also reports that although female college graduates are earning more bachelor degrees than their male counterparts, the wage gap of starting salaries is as apparent as $4,000. The NCES also states that gender was a cofactor by reporting that “about half of the difference in overall median starting salaries between males and females is attributable to gender differences in choice of college major.” As a result of gender inequality in education, women are also denied the opportunity to develop skills that will help them take charge in their homes, careers, communities and countries. Alleviating the women of the educational barriers allows for women to participate in economic advancement. Women who work bring home more income, raise the standards of living, and minimize pregnancies, all because of their higher education.

According to UNESCO (United Nations, Educational, Scientific, and Cultural Organization), young women are particularly at-risk for missing out on primary education in poorer, underdeveloped countries as a result of discrimination, along with (again) young pregnancy and (again) early forced marriage. The focus in underdeveloped countries used to be mainly focused on minimizing the gap between education and young girls, but has now shifted to providing education at all. This is sadly because school children are affected negatively by armed conflict in countries such as Syria, where the civil war advances and the number of out of
school children and adolescents in both primary and secondary education rise, resulting in the despairing number of out of school children jumping from 0.3 million in 2012 to 1.8 billion in 2013. UNESCO states that “as countries strive to achieve universal primary and secondary education through the new Sustainable Development Goals, the international community must dramatically increase aid to education for countries with the greatest needs.”

With access to education, a country such as Syria can rebuild itself. The UN Chronical condemns poverty as the main barrier against women’s educational advancement. Poverty is indeed a factor, but so are cultural and societal norms. Dr. Rohit Segal writes in “Women’s Education: Meaning and Importance” that:

“Cultural factors play an important part in creating barriers for women education. Some cultures do not value the education of women and girls, and do not provide them with the opportunity and support that they need to succeed at their studies. Until the middle of [the] nineteenth century, girls and women were educated only for traditional household works. Now, however, the society is witnessing changes in the role-status of women. There is greater emphasis on [the] education girls and women [receive], in the same way as we educate boys and men. The modern-day parents want to fulfill the aspiration of their children without gender parity. The educated women should insist on exercising their civil, social, political and economic rights. This will help improve the overall condition of women in the society. We can hope for better days while all women of our country will be enlightened and educated.”

Worldwide, more than 100 million young women living in developing countries are unable to read a single sentence that Dr. Segal writes. From stereotypes to gender pay gaps, to poor conditions and unsafe living conditions, women all over have been battling their own war: the silent gender-war. Feminism and many other movements have sounded off with the help of modernized social media platforms allowing for them to pave the way for millennial-activists at the forefront such as the renowned Melala Yousafzai whom sets an example by stating that “Each girl knows that education is her only path to a better future.”

Nevertheless, it is apparent that women are faced with undeserving treatment similar to that of
centuries-past. From discrimination in the workplace along with unfair wages due to the pay gap, and the ongoing continuation of breaking strongholds of educational barriers, women—who give so much and ask for so little—cry that the “time is up.” As a society, there has been a lot of progress, but there is still much work to be done. Hopefully, the next time a mother, a sister, an aunt or a grandmother sets the table, we take a moment to thank them for the everyday-hero they truly are. After all, we wouldn’t be here without them.

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“Women Still Face Inequalities and Often Multiple Forms of Discrimination.” European
Should Taxpayers Subsidize Sports Arenas and Stadiums?

Joseph Culbreath

For fifty years, no Major League Baseball franchise had relocated to a new home city (equally of note, no stadium had yet been funded by the public taxpayer). The future of sports franchises and stadium-funding changed forever in 1953 when the city of Milwaukee lured the Braves baseball franchise away from the Boston by offering a stadium that was funded by the public (Haddock 4). In 2012, after years of planning and construction, Jeffrey Loria’s Miami Marlins played their inaugural baseball season in the brand-new Marlins Park. Despite the spectacular Opening Day festivities, many citizens of Miami-Dade County chose not to participate in these events. Opponents to the deal believed Loria was strategically holding the county captive. The organization demanded that the stadium be funded by the public (all-the-while allowing the threat of relocation to loom over the fanbase).

While other countries rarely place the burden of stadium funding in public hands, American sports franchises have increasingly used public taxpayers as leverage in their pursuit of larger and more spectacular arenas and stadiums. In 2008, after numerous stadium-funding proposals were denied by the city, the Seattle Supersonics basketball franchise followed through on their threat to relocate to Oklahoma City. More recently, two National Football League teams have moved to the city of Los Angeles. To determine whether or not the opponents to public funding are correct, economic projections and previous precedent must be investigated.

In this study, prior stadium deals were intensely reviewed, with specific public tax statutes being observed. After observations of the tax reforms themselves, the next point of emphasis for the study will involve a deeper inspection of economic effects of nearby individuals, families, and businesses (as well as the overarching commerce of the host city). Major financing deals involving publicly-funded stadiums in the United States will be inspected. In stadium deals where the public is forced to pay a portion, public tax expenses will be compared with the resulting tangible benefits (revenues of urban businesses). A cost-to-benefit analysis will be undertaken. After having examined the historic revenues and expenses of host cities, our observations will turn into analytical projection, choosing to explore future cultural and economic growth. Positive and negative externalities of the life of a city will be investigated. However, empirical data and precedent will maintain a clear
control in determining the conclusion of this study.

Preliminary research points to a benefit economically and culturally for a number of situations involving cities and franchises. The goal of this project is to determine the statistical importance of this benefit.

What is the break point that separates a successful publicly-funded stadium from a burden? Although fans of these franchises may bemoan a county’s refusal to “foot the bill,” many populations of urban counties laud such decisions. They believe that while new stadiums may provide some economic benefits to nearby businesses, there is not enough of an increase in local revenue to warrant the funding of such a project. To determine whether or not the opponents to public funding are correct, economic projections and previous precedent must be investigated.

The majority of government-funding for stadiums and arenas is in the form of long-term, twenty-five-year to thirty-year municipal bonds. These two primary types of municipal bonds in stadium deals are general obligation bonds (secured by the “full faith and credit” of the state, local, or federal government) and revenue bonds (secured by future revenue streams, often from stadium-related operations themselves). Three decades after the Boston Braves’ relocation, the United States government attempted to curtail two issues that had arisen: to lower the percentage of stadium bonds that were tax-exempt and to lower the demand for publicly-funding stadiums. Vanderbilt University economics professor emeritus John Siegfried and U.S. economist Andrew Zimbalist explained the intentions of the bill:

The 1986 Tax Reform Act prohibited using municipal bonds that are exempt from federal taxation to finance the construction of facilities if more than 10 percent of the facility’s annual debt service is covered by facility-related revenues. (100)

Contrary to expectations of a reduced demand for public subsidies for stadiums and arenas, the bipartisan reform not only backfired, but it caused the exact opposite to occur. Eric Bull describes these circumstances in layman’s terms:

The process works like this: When a stadium is being built, a city can sell municipal bonds to help pay for its construction, like cities often do with public works projects. But if those bonds are issued as tax-exempt bonds (meaning that the interest payments to the bond holders are not counted as taxable income), the federal government loses a large chunk of revenue that it would have collected had the interest payments been taxable. And because this is lost federal revenue, the cost is footed by all taxpayers. On top of that, wealthy citizens who hold the bonds receive an implicit tax benefit due to their relatively high marginal tax
Since the Tax Reform Act of 1986, over a hundred professional sports stadiums and arenas have been constructed or renovated across the country. Spread amongst these projects is $21.7 billion raised to fund them, with two-thirds of the funds being from government subsidies (Yates 273). Are these long-term municipal bonds for stadiums worth the price of luring a sports franchise to a city? In 1993, San Antonio funded 100-percent of the funds required to construct the Alamodome (in hopes of acquiring an NFL franchise). The nearly $200 Million required for the construction of the stadium was funded via revenue bonds secured by two revenue streams: a mass transit tax and a half-cent sales tax increase (Appendix 32).

Despite the city’s efforts, no NFL franchise would call the city their home. While the Alamodome eventually served as the host arena for the San Antonio Spurs of the National Basketball Association, in 2003, just one decade after construction of the Alamodome, the city of San Antonio sought to build a new single-purpose arena for the NBA franchise. The $184 Million AT&T Center would be 84-percent publicly-funded.

Although the city of San Antonio was not attempting to host a Super Bowl when they built the AT&T Center, there are teams that turn to the public to help fund renovations (or replace a stadium altogether) in hopes of being awarded one. A city that hosts a Super Bowl, World Series, or All-Star game can see revenue of anywhere from $75 Million to $500 Million (Baade 8), yet the other ninety-five percent of teams in that sport’s league will not experience the rewards from investing money into a stadium. It is a major risk, as the economic burden will be even heavier with an unsuccessful host bid campaign.

An apparent advantage (from the perspective of the city) to using revenue bonds over general obligation bonds is that “the burden falls upon tourists and business travelers, not the local population” (Cannuscio 22). However, it is also vital to note that not all revenue streams (for municipal bond security) are immune to failure. In New York City, the new Yankee Stadium was partially funded by public funds. The $480 Million tax-exempt bonds included a revenue stream from the stadium’s adjacent parking garages. Unfortunately, revenue from parking is abysmally low. Marquette University’s Sports Facility Report documents the lack of revenue (and the resulting fallout):

The Bronx Parking Development Company, which runs the garages for the new stadium, is expected to default on its bond payments by the end of 2012. The
expected default due to lower than anticipated usage of the parking garage, which only have an estimated 38% occupancy rate on game days. (Appendix 32)
Regardless of political affiliation, state and local municipalities are not afraid to rely on the public to “foot the bill,” even when it is due to detrimental financing strategies of the governments and the franchises themselves.

What positive and negative externalities can occur as a result of a new stadium in a city? Garrett Johnson of the University of Denver Sports and Entertainment Law Journal maintains that “the main benefits that comes [sic] from having a professional team are intangible” (39). First and foremost, many argue that the cultural identity that is built into municipalities (with at least one professional sports franchise) can be enormously influential on the psyche of a city. In a sample survey of Indianapolis residents, “75 percent of residents felt that the city’s reputation would suffer if the Colts were to move cities and 81 percent felt the same way about the Pacers” (Holland 14). Even residents of a city that do not attend games claim this sense of “civic pride” (Groothuis 526). However, a consensus remains to be met. A West Virginia University and University of Alberta joint-study concludes with the contrary:

The argument in favor of government subsidies for stadiums that holds the most weight is that there will be a spark in economic growth in neighboring businesses (and markets in the region as a whole). However, Roger G. Noll, author of numerous works on stadium taxes and funding, Stanford professor emeritus in economics, and former senior economist for the President’s Council of Economic Advisers, denies the possibility of entertaining this argument in the first place if all other arguments (for public subsidization) are weak: “The overriding conclusion of this discussion is that the economic case for publicly financed stadiums cannot credibly rest on the benefits to local business, as measured by jobs, income, and investment” (6). Nonetheless, these arguments will be tried.

While many sports owners claim that cities will receive an economic benefit that outweighs the...
cost of the public subsidies, little-to-no research backs up their claims. Not only do Siegfried and Zimbalist assert the consensus of economic and academic journals’ findings, but they also attempt to discredit the small number of studies that do support public funding:

Few fields of empirical economic research offer virtual unanimity of findings. Yet, independent work on the economic impact of stadiums and arenas has uniformly found that there is no statistically significant positive correlation between sports facility construction and economic development . . . These results stand in distinct contrast to the promotional studies that are typically done by consulting firms under the hire of teams or local chambers of commerce supporting facility development. Typically, such promotional studies project future impact and almost inevitably adopt unrealistic assumptions regarding local value added, new spending, and associated multipliers. They often use a regional input-output model that depends on outdated technical coefficients which are treated as invariant to shifts in supply and demand. (103)

Upon further independent research, the studies supporting public funding for stadiums that have been released by public accounting firms (including KPMG and Deloitte & Touche) are admittedly (by the firms) funded by teams such as the Baltimore Orioles and New York Yankees. Even independent studies that do support public-funding admit in their research that “There is, however, overwhelming evidence that the benefits projected in economic impact studies do not materialize” (Owens 1). Supporting Siegfried and Zimbalist’s findings are Jordan Rappaport and Chad Wilkerson of the Federal Reserve Bank of Kansas City, who credit faulty statistics as a partial contributor to the firms’ findings:

These impact studies that justify stadium projects can be subject to a number of criticisms. Many of the studies look at only the positive effects of hosting a major league franchise. Taking account of negative effects such as offsetting job losses, however, would produce much lower estimates of the net impact on local economic development. (60)

Even in major cities, this “economic growth” claim is minuscule, if not negative. Siegfried and Zimbalist’s research shows that “For a medium-size city like St. Louis, the baseball team accounts for less than 0.3 percent of local economic activity; for a large city like New York, a baseball team contributes less than 0.03 percent of economic output” (104). Is such a small amount of activity worth it? Supporting their claim is a policy brief by Sarah Wilhelm, PhD, for the...
University of Utah’s Center for Public Policy and Administration: “In the 30 metro areas where there was a change in the number of stadiums, 27 areas showed no change in per capita personal income growth and three showed a negative change” (8).

The catalyst in reaching a decision in the argument of stadium funding is the opportunity cost of spending taxpayer dollars on stadium construction. For every dollar spent on building a new stadium (or renovating an old one), that dollar could have been spent on something more valuable. Per Baade and Matheson, not only may tax revenue not be spent in the most efficient way possible, but dollars could be “leaking” out of a local economy: “spending at a sporting event could actually reduce local incomes, as money is diverted from an activity with a high multiplier, for example a dinner at a locally owned and operated restaurant, towards sports, an activity with high leakages” (11).

In a world of scarcity, where the resources of an economy will never satisfy its members unlimited wants and desires, every dollar, especially that of a taxpayer, must be spent in the most beneficial way possible. It is up to a municipality’s citizens and elected officials to determine what is the best way to spend taxpayer dollars. Sports franchises will continue to receive public funding for as long as they are able to, as the power of team pride in a community is an incredibly strong force in society. The intangible effects of a sports franchise may or may not be a positive. It is apparent that, economically, the growth as a result of having a stadium is merely a “drop in the bucket.” However, in conjunction with the consideration of opportunity cost(s), it is obvious that money spent on stadiums could very well be spent on other factors in a local market.

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Media Bias

Kiona Kumpulainen

For decades, the public has relied on the media to present them with factual information. Media trends have changed over the years, and news channels have continually become more biased. Although the news has never been completely objective, it certainly was more so during the 1940’s when the Federal Communications Commission, a Government agency created in 1934 to regulate communications, introduced The Fairness Doctrine. According to the Gale Encyclopedia of American Law, this doctrine was not officially a law, but a policy directed at radio broadcasters in order to introduce balanced topics to the public. This policy coerced broadcasters to present the public with controversial issues while airing contrasting viewpoints in effort to preserve objectivity in the news (Batten). Although this policy was proposed to produce fairness and even-handed commentary, the media soon began to disapprove of the Fairness Doctrine (Batten). As the Gale Encyclopedia of American Law explains, the media viewed this set of rules to be unconstitutional and argued that it violated their first amendment rights (Batten). The Fairness Doctrine was still in use until the 1980’s when technology had become more widespread and broadcasting was no longer the only available resource (Batten). Because the Administration in charge of the FCC viewed the doctrine violated the first amendment, it was abolished in 1987. Congress attempted to stop the doctrine from being abolished, and acted by proposing the Fairness in Broadcasting Act, but President Reagan vetoed it (Batten). Since then on, it has been the news media’s responsibility to abide fairly and present the public with factual and un-biased information. However, as writer Robert Kiener states in an article, many media critics understand that partisan programming has risen consistently due to the fairness doctrine being abolished in 1987 (“Media Bias: Is Slanted Reporting Replacing Objectivity?”). Moreover, as a result of this, the increasing number of one sided journalists has caused a major problem in today’s society. United States Representative of Texas, Lamar Smith, spoke at a Political conference in 2013 and stated, “When the media don’t report the facts, Americans can’t make good decisions. And if Americans can’t make good decisions, our democracy is at risk. So media bias, to me, is a major threat to our democracy” (Media Bias: Is Slanted Reporting Replacing Objectivity?). When Journalists report the news, they often lead toward one side politically, and share their own opinions. News channels compete with each other to win viewers, but often disregard presenting the public with factual information. The fact
of the matter is, media bias is prevalent and not much seems to be done about this. Media bias has become more widespread within the years as a result of political bias which has contributed to the political polarization current in today’s society.

A Pew research study was done to interpret the media trends of cable media news outlets: FOX, MSNBC, and CNN. The study took place between the first five months of 2007 and 2012. During this time, half an hour of afternoon programming and half an hour of evening news programming was sampled from each station. The findings were that by 2012 the programming formats of all three networks looked increasingly alike, which was a change from 2007, when MSNBC spent the most time on interviews and CNN spent more of its time on edited packages (Jurkowitz et al). The changes in these networks occurred in 2012. Though Fox News had the least change after the five years, it altered its formatting mostly during the daytime, with an increased number of packaged segments and interview segments. MSNBC changed its formatting mainly during the primetime, where an increased number of edited packages were brought into the program, and interviews were cut. MSNBC became more liberal to contrast with FOX news’ conservative prime time. MSNBC made most of the formatting changes during the primetime, and Fox News during the day time segment, while CNN reformatted during both (Jurkowitz et al). During the five years, CNN doubled the percentage of time that consisted of airtime interviews, while airing almost half the amount of edited packages. The amount of time involved with live, breaking news reports was cut in half. Throughout this study it was found that live breaking news and non-ideological programming had decreased, and opinionated interviews had become more prevalent during both the daytime and primetime. According to the Pew research study, one reason for this may be because it is much less expensive to fill broadcasting time with interviews rather than live on the scene coverage, due to the fact that no correspondents or extra news crew are needed. (Jurkowitz et al). This may be a factor which is contributing to the increasing amount of media bias prevalent in today’s news.

The newshole is the amount of daily available space on the news. This consists of the program time (Solomon, W. 2009).

Based on the percentages of the newshole, during the five years, live breaking cable news dropped from 10% to 5%, during the day, within the time frame of 2007 to 2012. It was during this time that live staff reports lowered from 23% to 18% (Jurkowitz et al). During the five years, the highest difference in programming seemed to have changed during the...
daytime, while the prime time had less changes (see fig. 1 & 2 on next page). The percentage of interviews during the daytime increased drastically from 39% to 51%, while during the prime-time news, the percentage of broadcasted interviews only increased from 48% to 51%, and the change in packaged reports was only minor, as it dropped from 34% to 30%. Finally, the live staff footage lowered from 7% to 6%, and the low percentage of live events grew from 1% to 2% (Jurkowitz et al. 4). Researchers found that because these news outlets have cut out an increasing amount of breaking live news coverage, they have filled the time with more interviews, which evidently consist of more opinion. The daytime’s formats have become more similar to prime time coverage over the years, which validates that it has become more biased.

Source: Pew Research’s News Coverage Index

Note: Figure 1: percentage from newshole data is from January- May of 2007 and 2012. Daytime programming from 2:00-2:30 EST.
Source: Pew Research’s News Coverage Index

Note: Figure 2: percentage from newshole data is during primetime coverage from January- May of 2007 and 2012.

One might ask, what is the cause of news bias in the first place? Where do people get their opinions from and what plays a role in forming these opinions? There are many factors which contribute to media bias, just as there are many effects of it. A few factors responsible for bias are journalists’ points of view which are formed from their own perceptions and experiences in the world around them, and society, which plays a key role. According to John Corry, a television critic and writer from the New York Times, media bias is certainly prevalent in the news but journalists are not biased deliberately and are not the root cause of it. He explains that it is the “dominant culture” that plays a role in determining the point of view to which journalists abide by. He goes on to explain that dominant culture shapes how people think and plays a role in determining what is good and just (“Time’s’ Corry says culture is to blame for perceived media bias”).

Another cause of media bias is political bias, which is formed by the political opinions journalists have. When there is any hint of political bias in the news, it creates a partisan slant, and merely gives information from one point of view. In order for television hosts and news programs to avoid presenting their news with partisan slants, they must become more open minded and avoid adding their personal views into the broadcasting. This may be difficult to achieve, as bias can be created both deliberately and unintentionally. According to Omer Yair from the department of Political Science at the Hebrew University of Jerusalem, when political bias is presented, it is often done both consciously and unconsciously. Although people understand that their own political opinions should not direct their decisions or actions, it is these political views that nonetheless often contribute to the way these people conduct themselves (2). Furthermore, although news reporters may strive to be objective, bias is inevitable.

I had the privilege of meeting with former news anchor of local WPTV News Channel Five, Chandra Bill, who spoke at a homeschool meeting. At the end of her speaking, students were given a chance to ask questions concerning her career, or any questions they had in regard to the news media. After asking for Chandra Bill’s opinion on news media bias, and the reasons for it, she addressed an explanation in that every journalist is merely a regular human being with their own opinions and perceptions of the world
around them. She explained that although many journalists strive to be objective, they may unintentionally express bias when reporting, whether it be from their own commentary or “small statement” being added to daily reports, or whether it be a gesture or facial expression interpreting emotion of some sort.

She gave an example of how a news reporter who does not support Donald Trump, for example, may portray him in a negative way or add their own commentary instead of objectively reporting facts with little emotion. Another example she gave was that sometimes news reporters do not even realize that they may make certain facial expressions when reporting, which express how they feel toward something. She concluded that although news reporters should strive for objectivity, it is common for journalists to present partisan reporting.

It has been proven by a Pew Research Center Study, that opinion is more common than factual reporting. According to an analysis done by Pew Research in 2012, they found opinion outweighs traditional reporting mostly during the prime time coverage as a 70 to 30 percent ratio. The midday news also consists of more opinion and less factual reporting but only by 59% to 41%. During the morning the percent is a slight difference from 56% to 44% (Jurkowitz et al). As it has been proven in the previously mentioned studies Pew Research conducted, media trends have shifted and the news media has become more opinionated and biased, which has subsequently resulted in political bias and polarization throughout the country of the United States.

There is in fact controversy on this topic, as many broadcasters deny the fact that they are subjectively reporting the news, while others will admit they are leaning toward a political bias to counterbalance the bias coming from other news outlets. For example, in a Facts on File News Service article, it is stated that “conservatives have accused the mainstream media of harboring liberal bias” ("Media Power and Bias"). It has brought many conservative talk show hosts to address the problem by creating their own opinionated reports of the news to create what they call a balance. In effort to level the apparent left leaning bias that is present in the rest of the media, the article explains that a number of conservative media figures such as Rush Limbaugh, Sean Hannity, Bill O’ Reilly and Glenn Beck have issued their own conservatively biased coverage of the news ("Media Power and Bias").
Liberals, on the other side, claim the reason for left leaning bias being prevalent in mainstream media outlets such as MSNBC is due to the fact that they view big news outlets such as FOX News to be a conservatively biased station and believe it is their right to counterbalance their own point of views with stations like FOX. ("Media Power and Bias").

In the midst of all the controversy, there are viewers who use subjectivity from the news to their advantage. They use political bias to back up their views and intensify their political opinions. When news media is to the extreme of one side, it can be the cause of polarization. According to Matthew S. Levendusky, an assistant Professor of political science at the University of Pennsylvania, supporting partisanship affects how people view the world by encouraging many to participate in motivated reasoning (3). He goes on to explain that like-minded media only affects viewers to become more ideological and close minded in their views, which results in polarization in people’s attitudes. (Levendusky 3).

Levendusky demonstrates that this causes viewers to become more driven to reach a conclusion similar to their partisanship, furthermore, increasing their biases (3). While political polarization has become a growing concern in the US, many have viewed partisan news outlets to be the blame for its frequency. A study conducted by the Pew Research Center was done in regard to partisan antipathy and political polarization. According to this study conducted by the Pew Research Center, the amount of Americans defined to be consistently conservative or consistently liberal has doubled from 10% to 21% within the past two decades. ("Political Polarization in the American Public"). With news stations becoming more opinionated and politically biased, this is by chance a factor contributing to the polarization. Instead of uniting our country, division is being brought among us. Parties have become more divided than they have been in the past. Ideological thinking and partisanship go more hand in hand than they have in the past, while ideological division has increased due to the overlap between the two parties diminishing tremendously. In 2014, when this study was conducted, 92% of Republicans were found to be to the right of the median Democrat, while 94% of democrats were found to be to the left of the median Republican. Since 1994, the number of people within each party with antagonistic views of others in the opposing party has more than doubled. ("Political Polarization in the American Public").

Are biased news channels causing this political polarization? While news channels consist of bias,
what viewers watch has an influence on them, whether it be negative or positive. As Dr. Tim Groseclose, professor of Economics at George Mason University explains in “A Social Science Perspective on Media Bias”, media bias is defined as an ideological slant, often coming in the political form as liberal or conservative (2). Furthermore, because both liberal and conservative journalists have their own opinions and often express it in the media during commentary, viewers either grow fond of what they hear or dislike the bias, and therefore turn to news outlets that coincide with their opinions. For example, say a moderate conservative citizen were to watch an MSNBC report; they may dislike what they are hearing for the reason that it is biased and against their political beliefs.

As a result of this, the conservative individual may turn to a news outlet in favor of their political views, such as FOX, and become more close minded and extreme as a conservative, because of the strongly conservative news outlets which have played a role in reinforcing and intensifying their views. In the same way, a democrat may become more passionate about their views after watching a news channel in favor of their views, such as MSNBC. Because political polarization occurs when one becomes strictly defined by their political views, we can conclude that the news media may very likely be a factor which has contributed to this polarization. Another way the news media may be affecting not only polarization, but politics in general is when they report on presidential candidates. According to James N. Druckman, professor at Northwestern University and Dr. Michael Parkin, candidate of Political Science at the University of Minnesota, when the news media outlets cover campaigns, they choose specific issues to emphasize, outline events in different ways and often tend to describe candidates diversely. Because of this, viewers and voters form their opinions on candidates based on what they hear and see on the news, just the same way they form positions on events based on the way that news channels cover them (1).

Another way in which the media affects how voters perceive candidates is during presidential elections, when journalists and media outlets often appear to be favoring certain candidates over others. This has affected Americans and shifted American politics. As writer Dan Whitfield explains, a 2008 study conducted by “The Project for Excellence in Journalism” reveals that stories covering the Presidential candidates were shown in more positive ways toward then- Senator Obama meanwhile journalists spoke more negatively of Republican candidate John McCain; as polls indicate, and the
number of voters who believed professional journalists supported Senator McCain was a low 9% (58). Perhaps because the mainstream news media generally appear to be on the left side of the political spectrum, Democrats favor what they hear on the news, while Republicans disapprove of the bias. As writers from the Pew Research Center explain from their studies, Republicans are more likely to view news coverage as being biased, and Democrats are more likely to say that the mainstream news does well when presenting stories that they value (Kristen Purcell et al. 19).

Perhaps Democrats seem to favor MSNBC for the reason that it is liberal and consistently opinionated. Pew Research conducted a study where they examined programming during December of 2012, where they found MSNBC to be the most opinionated of the networks, while during its primetime, 90% consisted of opinion or commentary. (Jurkowitz et al). Although most news media seem to be on the left side of the political spectrum, there are also media outlets conservatively biased, such as FOX news, and radio programs hosted by conservative hosts which have possibly contributed to polarization. In contrast, although there are many television media outlets aware of their ideological programming who avoid replacing it with objectivity, there are indeed other news channels in favor of unbiased reporting and because of this, many viewers find these objective channels to be the most trustworthy networks.

According to a Pew Research Study, BBC news was found to be the most trustworthy network by all ideological groups (Pamela Engel). The reason that many view BBC to be most trustworthy is because it is least biased, while other news outlets such as FOX and MSNBC are only trusted by people of certain ideological groups. As a Pew Research Center survey found, consistent republicans were found to rely solely on one news source and distrust the most other media outlets out of all groups being surveyed (Amy Mitchell et al). Polarization has evidently been a result of media bias and has dangerously affected our Country. Polarization does not unite a country, but instead divides parties further apart. As Matthew S. Levendusky, explains, in order for America’s constitutional system to thrive, with the way it is structured in the separation of powers and number of veto points, people need to come together to form a unity, while compromises must be made to form agreements (1). However, when the media plays a role in segregating ideological groups, tension arises, and when parties are divided, it is harder for people to come together as a whole and coexist peacefully, as we should be while thriving and prospering together successfully as a nation. Levendusky asserts that when citizens hear only one side of issues, they become narrower minded in their views, preventing them from
forming an agreement with those on the opposing side, which makes it more difficult to solve problems (1). Howard J. Gold, a Professor of Government at Smith College explains in a CQ Researcher Article, that when Americans grow up in what he calls “segregated bubbles”, and are less likely to hear contrasting points of views, an effect which may come into play is polarization (“Polarization in America”). The news have not only been the blame for the increasing amount of political bias but have also played a massive role in the division among both ideological groups. In order for the nation to integrate together for the well-being of the country, journalists need to put their opinions aside during the news, or instead allow both sides of an argument during political commentary, while viewers need to become more open minded and watch multiple sources of news media outlets to broaden their views, instead of relying solely on one and disregarding the rest.

Finally, viewers must be willing to occasionally compromise their beliefs in order to find common ground. Citizens should be able to hold their own beliefs yet engage in respectful discussion. The media should show both sides to an issue, so viewers do not merely favor one side and disregard the other. In order for there to be peace and unity in a society, people need to come together, rather than divide apart.

Although reporters and viewers should be able to exercise their rights of freedom in their beliefs, while practicing freedom of speech, news outlets should report the facts rather than promoting a distorted biased opinion which ultimately results in political polarization and segregation among both political parties.

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Taking a Gap Year

Thalles de Oliveira Caiado

A gap year is a year off from education. It may occur during any time before or during college, with the purpose for the student to clarify what he wants to achieve during his post-secondary education (Bull). According to a recent survey from University of California, Los Angeles, out of 300,000 first-time freshmen at four-year colleges and universities 1.2% waited a year to enter college. In this paper, we will look at the cons of taking a gap year, and the pros of taking a gap year.

However, some might argue that a gap year may lead students to a stressful process when they decide to return to the studies. When these students return to school, they might find that their peers who did not take a gap year have advanced ahead of them. The New York Times best selling author Michael Thompson believes, “There are risks if an unmotivated student takes an year off from college.” For instance, if the students take an entire year off school, they may have forgotten many mathematics, grammar rules, or physics formulas used in college. The students have to spend time figuring out those subjects they may have forgotten. As a result, students who are not self-learners will also have to spend money with tutors in order to figure out what they have forgotten.

Additionally, after an entire year of earnings, students may not feel motivated to give up their salary. The students might consider whether spending four years in college is more valuable than working and having a salary. According to special correspondent John Tulenko of Education Week, students are lacking the necessary foundation to continue into college or university: “How can educators better train those who may struggle in trying to pick a course of study?”

Moreover, statistics show students who graduate from high school and enjoy the work force rarely enroll in a college or university: “nearly 40 percent of students in four-year colleges and 70 percent of students in community colleges [do not return to their studies] given the high costs of a college education and the problems with student debt” (Should More Kids Skip College?).

Moreover, some claim a gap year might further confuse students as to their major. Writer Karl Haigler claims that a gap may lead to confusion for students: “students [may] lose direction after taking time off and don’t enroll in college” (qtd. in Shellenbarger). A student could decide to work on a specific field that he might feel it fits his profile. He wants a glimpse of how working on that specific field is
like; if he enjoys the position, he will be sure about what major to go for. On the contrary, if he does not enjoy the position at all, he could end up unsure about what major to pursue. For instance, the individual starts to work in an office to see if maybe the business environment is enjoyable. However after one year, the person may be still undecided, and in the end, they decide not to return to the university in order to seek more job positions in other fields. Because of the indecision about the major, the individual decides to take another year to figure out whether he would major in a different field, such as Engineering or Computer Science. The person may stay working and never return to the university. Additionally, when working, students face many different areas that they may work in. According to The Wall Street Journal writer Toddi Gutner, “Students can research many of the 8,000 educational programs, internships and public-service jobs on their own, but many find it daunting.” Students may deal with the Information Technology staff, the Human Resources staff, and the managers staff; for many students, those numerous options can get them confused and make them even more undecided.

In contrast to the above claims, it can be argued that a gap year is a great opportunity for students to become more mature. Research from the University of Wisconsin, La Crosse, and published in January in the journal Labour Economics shows that students with a graduate diploma alone are not as appealing for the job market as students who worked during the academic year. In addition, the same research shows that students who worked during college “boosted employment prospects significantly, increasing (...) rate by 14%” (qtd. in Silverman). Many students go into college right after high school and then graduate with no work experience. Employers typically ask for at least one year of work experience, but because some students might just have a degree and no work experience, they have trouble finding a job, or they might have to work in a sublevel of their major until they become an experienced professional.

According to the American Gap Year Association, most students believe a gap year was helpful to find a job: “88 percent of gap year graduates report that their gap year had significantly added to their employability” (Gap Year Survey). Working during college gives the student a practical understanding of the field and not only a technical one. Spending a year working will give the student a new perspective on life; he will learn that one does not deal only with machines and calculators in a company, but also with lazy co-workers, stressed clients, and strict managers. Furthermore, working during college is a great resume-builder.
In addition to giving the student work experience, a gap year provides money for students to invest in their education. It is well known that a post-secondary education is not cheap. According to the *Free Money Finance* report, students who work “earn at least $10,800 a year” to expend for college, such as tuition, books, and food (“Use a Gap Year”). If the student has a good financial plan, he may make enough money to pay almost half of his studies in a public university in Florida. According to Florida Atlantic University’s website, “the average in-state tuition for the university is $6,336 for 30 credit hours.”

Additionally, research shows that earning money during college is a great learning for students that helps them during life. For instance, a gap year may help students to budget themselves and to not rely on their parents for extra money. According to counselors, “students who have to earn their own pocket and entertainment money learn budgeting and are less likely to overspend” (Clark).

Besides saving money for college, a gap year is a great network-builder. When working, students meet people who can help in their future careers even if they decide to change their major. In addition, students who worked before for a company are more likely to be hired by the same company after they graduate. For example, National Association of Colleges and Employers’ Internship and Co-op survey reports, “the primary focus of most employers’ internship and co-op programs is to convert students into full-time, entry-level employees.” A boss who is familiar with the student’s work may feel confident in hiring him instead of an unknown person. Moreover, if the student has worked before for the company, he will be familiar with the environment and the people in it, which minimizes stress or problems adapting to the new job, such as being aware of how the company evaluates job performance.

Clearly, a gap year might represent a waste of time for students that are already about their major, as they will lose one year of school and may lose their pace and focus on academia. For those students, working on a specific environment in order to have a perspective of how their future career might look can be confusing. In addition, after one year of earnings, they may not be interested in quitting the job and going back to school. On the other hand, a gap year is a great opportunity for goal-oriented students to gain a fresh job perspective. For those students, a gap year means a rewarding time when they become clear of their academic direction and learn life experience before deciding their major. College students should weight whether a year off school is a waste of their time or an investment in their future careers and an
opportunity to build network. A gap year is a two-way highway that can lead students to lose pace in school or to allow students to establish and accomplish professional goals.

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Pierre Simon de Laplace and his Transform in Modern Society

Christy LaFlamme

Abstract

In modern society, most scientists and engineers still regularly apply the work of geniuses whom have long since passed away. Particularly, the work of one man by the name of Pierre Simon de Laplace has been greatly underappreciated. Most people today would not be able to recognize his name let alone be able to list any of his accomplishments. Once called the “French Newton,” Laplace made major contributions to the fields of planetary astrology, Newtonian mechanics, and mathematical physics (Simmons, 2009). This inquisitive man also devised a famous improper integral known as the Laplace Transform, which has been utilized to solve linear differential equations, boundary value problems, and physical applications (The Editors of Encyclopædia Britannica, 2017). Although Pierre Simon de Laplace is given little recognition in modern society, his contributions have made innovations in science and engineering possible, especially his Laplace Transform, which is still taught in differential equations courses and used by engineers today. Pierre Simon de Laplace deserves to be celebrated for his outstanding accomplishments which have made advancements in today’s ever-changing world a reality.

Considered one of the greatest successors to Newton, Pierre Simon de Laplace made major contributions to the fields of mathematical physics, planetary astrology, and Newtonian mechanics (Simmons, 2009). A majority of the engineers and scientists in modern society still regularly apply the work of this genius but know little of his story or other major life accomplishments, which have been greatly under distinguished. Most people today would not be able to correlate Laplace’s name with any of his discoveries. Although Pierre Simon de Laplace is sadly underappreciated in modern society, his contributions have made innovations in science and engineering possible, especially his Laplace Transform, a tool recognized by any undergraduate who has taken differential equations. The Laplace Transform, utilized to solve linear differential equations, boundary value problems, and physical applications, has been a staple in preserving Pierre Simon de Laplace’s legacy.

Pierre Simon de Laplace, born on March 23, 1749 in Beaumont-en-Auge Normandy, France, has been called the greatest scientist of the late eighteenth and early nineteenth centuries with good reason. Laplace, born to an official of the local parish and a
family of farmers, attended the Benedictine school at Beaumont-en-Auge from age 7 to 17 under the tutelage of his uncle (Minderović and Young, 1998). He was noticed for his brilliance in mathematics standing out for his skill, intelligence, and memory at this local Beaumont military academy (Whitrow, 2017). Soon after this recognition, Pierre Simon de Laplace ventured to the University of Caen to continue his studies in theological training (Simmons, 2009). However, his interests in mathematical and scientific fields flourished and were encouraged by several professors, whom prompted his intensive study of mechanics. Only two years thereafter, he left the university on a whim to travel to Paris with only one letter of recommendation in the pursuit of working with mathematician Jean d’Alembert (Minderović and Young, 1998). After immediate rejection, Laplace sent d’Alembert a scholarly paper about mechanics and the principles of motion, which forced Jean d’Alembert to recognize his originality and genius and offer him a teaching position at the École Militaire as a mathematics professor (Simmons, 2009). However, rumors spread that d’Alembert’s change of heart was actually due to Laplace’s amazing ability to solve two of his mathematical problems overnight (Minderović and Young, 1998). This was only the beginning of what Laplace would accomplish in his lifetime. It was in 1773 that he began his major work for which he is most notable as a truly inspiring astronomer, physicist, and mathematician.

Most of Pierre Simon de Laplace’s early work involved some element of the cosmos including planetary motion, cosmology, and the theory of probability among many others. Laplace proved that deviations within the planets of the solar system would never change their distances from the sun (Simmons, 2009). One problem in particular relating to Newtonian gravitation in the solar system about the relative changing sizes of Jupiter and Saturn’s orbits took center stage in Laplace’s ever-thinking and problem solving mind (Whitrow, 2017). He sought to understand exactly why it appeared as though Saturn’s orbit continually grew, while Jupiter’s orbit continually shrunk. To represent these physical phenomena in terms of mathematics was certainly no simple feat. Laplace utilized integral calculus to the solution of differential equations to show the invariable nature of these planets’ average angular velocities and ability for them to correct their orbits themselves (Minderović and Young, 1998). He was awarded an associate membership in the French Academy of Sciences soon after this discovery made this great advance in the physical astronomy of the time. Along with this breakthrough finding, Laplace introduced the moon’s acceleration as a function of the earth’s orbit and
calculus to explain the movement of celestial bodies (Simmons, 2009). With the aid of chemist Antoine-Laurent Lavoisier and a hand-made calorimeter, he showed how respiration is actually a variation of combustion (Whitrow, 2017). Laplace also forged the way for the future of electricity, magnetism, and heat through his Laplace Equation and the Laplacian zero. An article in Wired remarked, “And with those five symbols, Laplace read the universe” (Cole, 2017):

\[ \nabla^2 u = \frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0 \]

He published several works such as Théorie du Mouvement et de la Figure Elliptique des Planètes (1784), Exposition du Système du Monde (1796), Traité de Mécanique Celeste (1798-1825), and Théorie des Probabilités (1819) all of which revolutionized the science of his day and provided a pathway for future innovators to build upon. Many of these papers had focuses on such topics as integral calculus, differential equations, and finite differences (Rouse Ball, 1908). After escaping the French Revolution, Laplace continued on his intellectual journey until the very end of his life.

Pierre Simon de Laplace’s last words, thought to be along the lines of, “What we know is nothing in comparison with what we do not know,” rang true to his deep rooted curiosity about the unknown universe (Gindikin, 2007). Exactly one hundred years after Newton’s death on March 5th, 1827 at nine o’clock in the morning, Pierre Simon de Laplace passed away as the “French Newton” he had always aspired to be. To this day, mathematicians, engineers, and physicists use his work on a daily basis. Pierre Simon de Laplace not only made major contributions to fields such as modern Newtonian mechanics and planetary astrology, but also created a mathematical “Transform” that has made innovations in engineering possible today. As previously mentioned, this famous Laplace Transform may be used to solve linear differential equations with constant coefficients. This simple yet intricate integral has been a useful tool, allowing engineers to create solutions to the greatest problems of mankind.

The “Laplace Transform” is named firstly for the man who created it and secondly for the type of mathematical tool that it is. To “transform” in mathematical terms means to subject something to a mathematical transformation, which is Merriam Webster Dictionary defines as the following: The operation of changing (as by rotation or mapping) one configuration or expression into another in accordance with a mathematical rule; especially: a change of variables or coordinates in which a function
of new variables or coordinates is substituted for each original variable or coordinate.

The idea of a transform may be best understood as similar to that of a logarithm and antilogarithm, which were used to simplify tedious expressions, such as 53,976 times 99,876, before the development of the modern calculator (Smith and Campbell, 2011). The Laplace Transform enables its user to transform ordinary differential equations of initial value problems into algebraic equations or transform partial differential equations into ordinary differential equations (Farlow, 2015). By using the time domain variables “t” and “u” and the transform domain variables “s” and “U”, the Laplace Transform allows its user to switch back and forth between domains (Logan, 2006). The user will take the improper integral of the positive values from zero to infinity of e to the negative “st” where “t” usually represents time and “s” usually represents itself in the unit of time inverse, time^{-1} (Smith and Campbell, 2011). Then, the user will multiply that expression by f(t) differential t as shown below where f(t) is a function of t:

$$L[f] = F(s) = \int_0^\infty e^{-st} f(t) \, dt$$

Because the Laplace transform converts differential equations into algebraic equations, it becomes a powerful tool for handling multiple equations at once (Smith and Campbell, 2011). An equation tied to the Laplace Transform, known as the inverse Laplace Transform, is used to transform the expression back into its original form. Oftentimes, common inverse Laplace Transforms are read from a reference table. The inverse Laplace Transform allows its user to reverse the process above from 1/s to 1:

$$L^{-1}[f] = f(t) = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} e^{st} F(s) \, ds$$

Both the Laplace Transform and Inverse Laplace Transform may be applied to problems in mathematics, engineering, and beyond, which is why they are often considered two of the most useful and valuable tools taught in undergraduate mathematics courses for engineers. A table of common Laplace Transforms and Inverse Laplace Transforms may be as follows where k is a constant and t is a variable (Stroud and Booth, 2005):

<table>
<thead>
<tr>
<th>f(t) = L^{-1}[F(s)]</th>
<th>F(s) = L[f(t)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>k</td>
<td>\frac{k}{s} when s &gt; 0</td>
</tr>
<tr>
<td>e^{-kt}</td>
<td>\frac{1}{(s + k)^2} when s &gt; -k</td>
</tr>
<tr>
<td>t</td>
<td>\frac{1}{s^2} when s &gt; 0</td>
</tr>
<tr>
<td>\sin kt</td>
<td>\frac{k}{s^2 + k^2} when s^2 + k^2 &gt; 0</td>
</tr>
</tbody>
</table>

|
Consider the following example to transform of the constant $1$ using the Laplace Transform:

\[ L[1] = \int_0^\infty e^{-st} \, dt \]

Now, in order to solve the improper integral, take the limit as $A$ approaches infinity of the integral from zero to $A$ to ensure mathematical correctness:

\[ L[1] = \lim_{A \to \infty} \int_0^A e^{-st} \, dt \]

Integrate $e^{-st}$ using u substitution:

\[ L[1] = \lim_{A \to \infty} \left[ -\frac{1}{s} e^{-st} \right]_0^A \]

Using the Fist Fundamental Theorem of Calculus, evaluate the definite integral from zero to “$A$” when $s$ is greater than 0:

\[ L[1] = \lim_{A \to \infty} \left[ -\frac{1}{s} e^{-sA} + \frac{1}{s} \right]_0^A \]

Take the limit and simplify:

\[ L[1] = \frac{1}{s} \]

This is a common example of a simple number transformed using the Laplace Transform. Take a function such as $[t]$, and the Laplace Transform is as follows:

\[ L[t] = \int_0^\infty e^{-st} \, t \, dt \]
The answer after using the Laplace Transform, partial fractions, and the inverse Laplace Transform is:

\[ q(t) = \frac{E_o}{100} U(t - 1) - \frac{E_o}{100} e^{-2(t-1)} U(t - 1) - \frac{E_o}{100} U(t - 3) + \frac{E_o}{100} e^{-2(t-3)} U(t - 3) \]

These problems only begin to touch the surface of Laplace Transform's uses. Its applications reach far beyond the realms of basic calculus and electronic circuit problems. The Laplace Transform not only proves itself to be a useful tool for mathematicians and engineers alike, but more importantly has provided mathematical pathways to answering to science's greatest questions. Furthermore, new applications and uses for the Laplace Transform are continually being discovered in modern science.

AZO Materials, an online publication company for engineering and material science news, recently released two articles that showcase the Laplace Transform and inverse Laplace Transform being used by engineers today. In “Enabling Precision Motion Control with Harmonic Cancellation Algorithms,” the Laplace Transform of 1/s is used to form a step input as a model of constant disturbance for the linear-motor-driven positioning stage (Aerotech, 2017). Harmonic canceling algorithms are used in data storage systems, machine tools, and sensor testing (Aerotech, 2017). Here, the Laplace Transform plays a key role in canceling the disturbance to obtain a zero steady-state error (Aerotech, 2017). “Using the MFIA for Laplace Deep Level Transient Spectroscopy” explains how a Laplace Transform is calculated from the transient to distinguish sections of contributions within the data and to extract spectral density for Laplace Deep Level Transient Spectroscopy (Instruments, 2017). Laplace Deep Level Transient Spectroscopy is a tool developed by engineers at the Institute of Physics Polish Academy of Sciences in Warsaw and at the Microelectronics and Nanostructure Group, School of Electrical and Electronic Engineering at the University of Manchester, to reveal semiconductors’ electrically active impurities and defects (Laplace DLTS, n.d.). Both of these examples exist among the many applications of the Laplace Transform in modern science and engineering.

Pierre Simon de Laplace deserves to be recognized for his creation of the Laplace Transform along with his many other contributions to the advancement of the sciences. When he served under Napoleon Bonaparte, Napoleon stated that he “carried the spirit of the infinitesimal into administration”
(Whitrow, 2017). Some manuscripts note Pierre Simon de Laplace’s final words to be, “What we know is trifling; what we know not is immense” or “Man follows only phantoms” (Simmons, 2009). Although neither may be correct, both of these statements do illustrate Laplace’s deep-rooted passion for discovery and life-mission to answer some of the universe’s most probing questions. Today, engineers and scientists alike are able to advance society due to the works of geniuses of the past, particularly the under recognized Pierre Simon de Laplace and his transform. Without inquisitive men such as him, modern science would not be nearly what it is today.

References


Brandon Merino is graduating from PBSC in the Fall of 2018 and is planning on attending a university in New York City to pursue writing, producing, and broadcasting. He plans on pursuing his dream job of working creatively behind the scenes of film and television productions. Brandon is immensely grateful to Marcella Montesinos for allowing him another opportunity to co-edit for the prestigious Sabiduría journal.

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